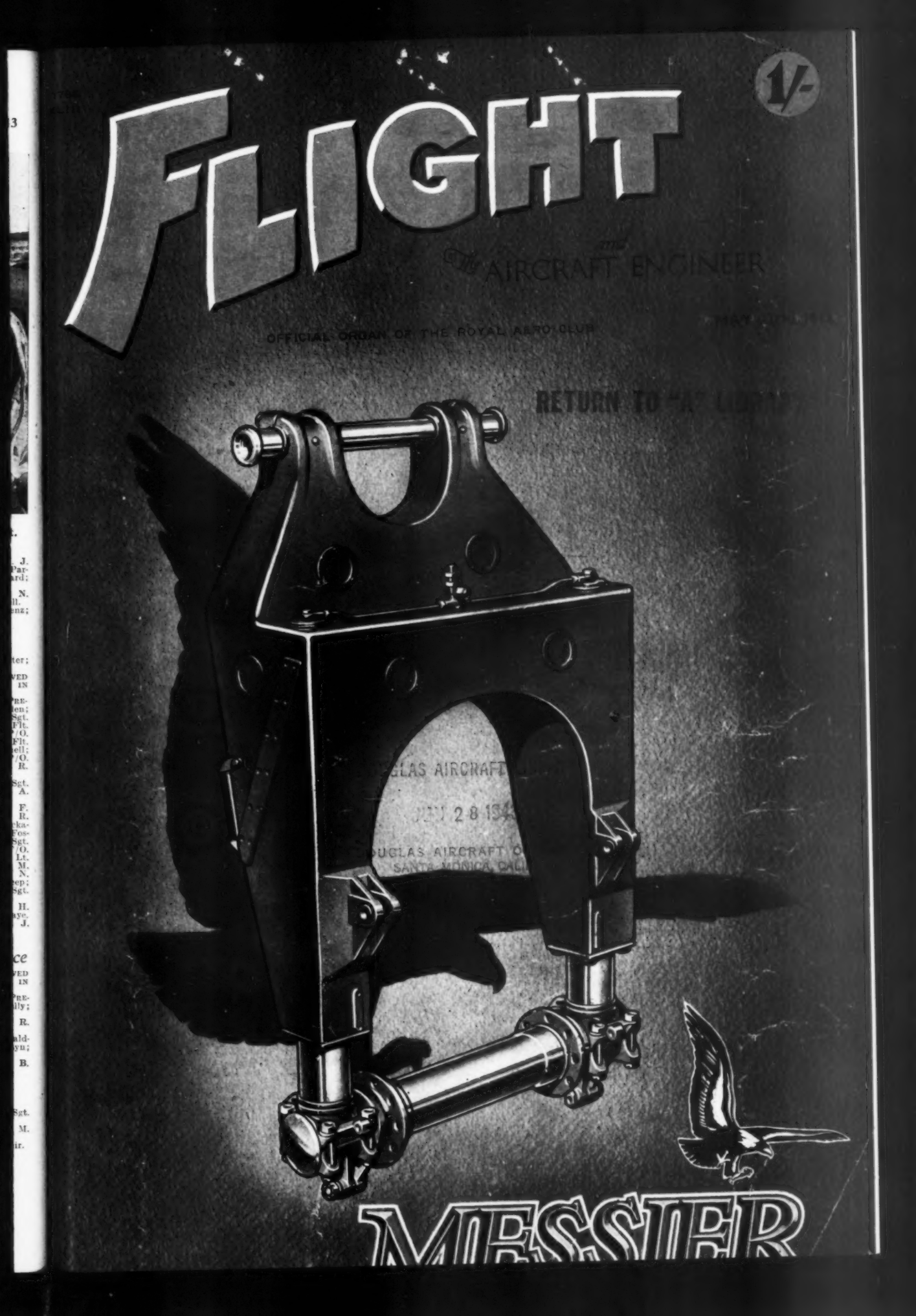
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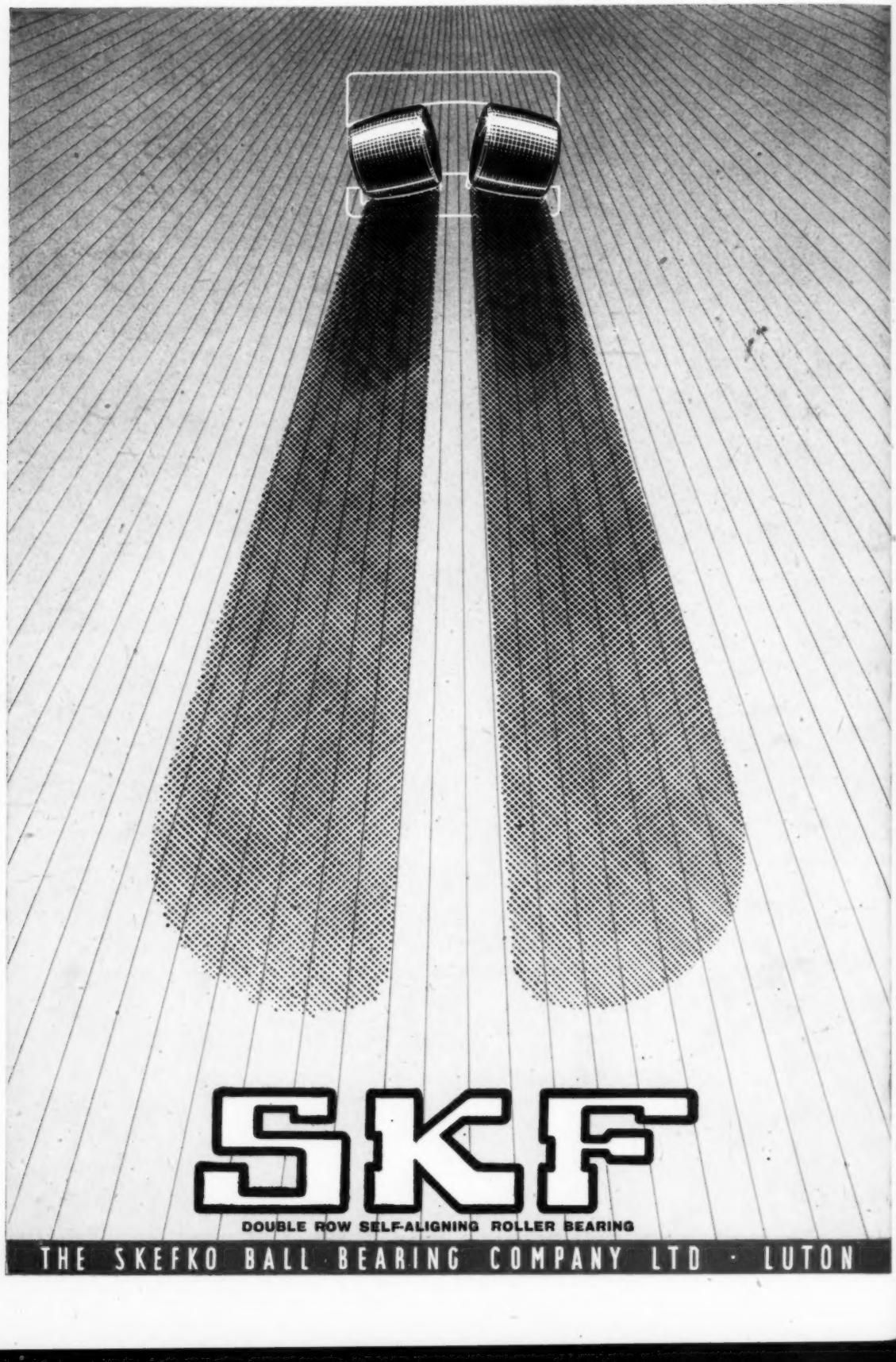
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FLIGHT and The AIRCRAFT ENGINEER

First Aeronautical Weekly in the World : Founded 1909

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The Outlook

The Boa Bombshell

ESCHEWING all accepted practice, the Government has appointed to the important posts of chairman and director-general of British Overseas Airways Corporation two men who, whatever other qualifications they may have, are entirely without experience in the very complicated and specialised business of operating long-distance air routes. Admittedly both Lord Knollys and Air Commodore A. C. Critchley have had contact with flying, the former having served in the R.A.F. in the first World War, and the latter, better known as Brigadier General Critchley, has for some time been in command of No. 54 (Training) Group initial training for the R.A.F., but that is as far as their practical experience of air operation goes.

Sir Harold Howitt, who has hitherto served as part-time chairman, becomes deputy chairman; he also was without experience. The same applies to the other two directors, Mr. Marchbanks and Mr. Simon Marks. It would be difficult to find another board of a great national corporation whose cumulative inexperience is as great as that of the new B.O.A. board, entirely unrelated to the operation of great airlines. It would appear that it was thought that at least one member of the board should know something about aircraft operation, and the selection fell upon Miss Pauline Gower. With this particular choice we have no quarrel. Miss Gower has been "through the air mill." With Miss Spicer she ran a passenger-carrying concern many years ago, and that work won the admiration of all. They obtained their ground engineers' licences and worked harder than most men. Since the war Miss Gower's contribution to the war effort as commandant of the Women's Air Transport Auxiliary has been of very great value to the nation.

Now that the Government has decided very tardily, following public pressure, that something will have to be done about the British Overseas Airways Corporation, there is little doubt that we shall see progress made in several directions. It is equally certain that the Government will claim the credit for having put in men who can and will "get things done." What will not readily be overlooked by those who have studied the problems is the fact that the original board, with all its faults, was severely handicapped by having aircraft and personnel taken away from the Corporation. The varied assortment of aircraft types with which they were compelled to operate as best they could precluded efficient operation, and taking into consideration all the difficulties, the Corporation has not emerged without credit. In all fairness to the directors who resigned some time ago in protest of existing conditions, this fact should be borne in mind.

Too Much "New Blood"

FRESH blood is all very well, but even in medical science it is administered in small doses. Some of the patient's own remains, and it might have been thought that in the case of B.O.A.C. some of the "new blood" would have been drawn from among those who have had twenty years' practical experience of operating airlines. It is difficult to believe that none of the many who possess that qualification is available, and one can only come to the conclusion that no endeavour has been made to find them.

Growing public opinion following long agitation in the Press for a Government policy on commercial air transport has forced the Government to further action. It was evident from questions in the House that dissatisfaction was felt at Government evasiveness or inaction

over a question so outstandingly important to the future national prosperity of this country and its Empire. Several independent and unofficial committees were set up with the avowed purpose of urging the Government to take action, and it has been stressed that men with the necessary experience capable of handling so complex an organisation were available if given the necessary encouragement.

The fact that the new appointments are for a period of four years indicates that it is the intention of the Government to retain B.O.A.C. as its "chosen instrument." For operation of the Empire routes there is probably no escaping a monopoly of some sort, although the task is great enough in all conscience to afford room for more than one company. But if Empire aviation is what the Government has in mind, one would have expected to find on the board representatives of the Dominions. It is very much to be hoped that Air Commodore Critchley will make it his first task to visit New Zealand, Australia, South Africa and Canada so as to discuss with their operators and Governments their particular views and problems. To attempt making a start without such contacts would be to place the cart before the horse.

"Continuous and Severe"

THE war has entered upon a new phase. "One continent at least has been cleansed and purged for ever of Fascist and Nazi tyranny," as Mr. Churchill said in his historic address to the United States Congress. The Allies have lost no time in using the African bases which the Tunisian victory gave them for sustained air attacks on Sicily and Sardinia. The Axis has lost hundreds of aircraft in combat and on the ground; and, in spite of stiffening resistance, the attacks will continue until the air over that part of the Mediterranean is in complete Allied control, thus opening the Sicilian Straits to our shipping, whatever its character and destination.

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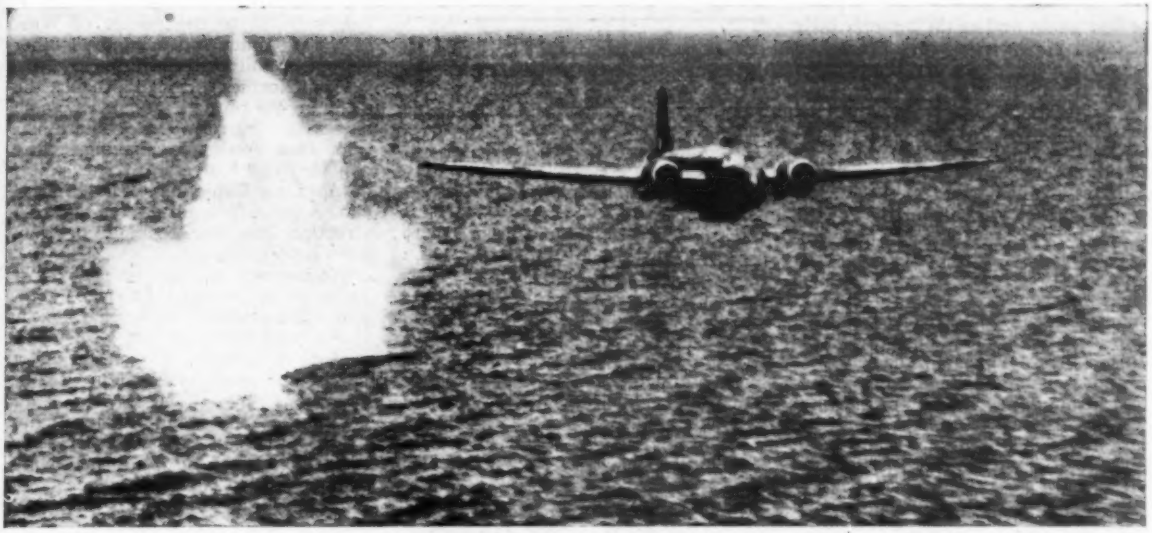
At home also the air war is being waged with an intensity and on a scale which must interfere very seriously with the enemy's war effort. The outstanding example is, of course, the bursting of the German dams, an exploit which has no equal in the whole history of flying. The loss of men was large in proportion to the numbers sent, but utterly insignificant when compared with the havoc wrought.

The attacks on German ports, naval establishments, factories and lines of communications continue on an ever-increasing scale by day and by night, and, again quoting Mr. Churchill's speech, "the more continuous and severe the air fighting becomes, the better for us, because we can already replace casualties and machines far more rapidly than the enemy, and we can replace them on a scale which increases month by month."

For the enemy the next few months will be a period of anxiety. That we shall strike he knows full well, but when and where no crystal-gazing can tell him.

FRANCO-BRITISH CO-OPERATION: Pilots and ground crews of a British and Free French fighter squadron celebrate the bringing down by the squadron of its 1,000th enemy aircraft with a Spitfire IX.



One of the specially adapted Vickers Wellingtons used for torpedo dropping in the Mediterranean.

WAR in the AIR

The Epic Assault on the Dams : Picked Lancaster Crews Trained in Secret : 336,000,000 Tons of Water Let Loose on the Hun

NO single exploit of the R.A.F. has ever dealt such a devastating blow to the enemy as the breaching of the Mohne and Eder dams, and it certainly takes pride of place in the now long list of Bomber Command's many achievements. Actually, three dams were attacked by the picked Lancaster crews under the command of Wing Cdr. G. P. Gibson, D.S.O. and Bar, D.F.C. and Bar, but the assault on the third, the Sorpe dam, does not seem to have been so overwhelmingly successful as those upon the other two; at least, official communiqués have said very little about it up to the moment of writing. But in any case, the havoc wrought to German war industry by the release of 134,000,000 tons of water from the Mohne reservoir and 202,000,000 tons of water from the Eder reservoir must be simply enormous. The result was twofold in character; it has swamped vast areas of territory, flooding out factories, power stations, railway communications, and even whole towns and important agricultural districts, and it has deprived those power stations and plants not in its immediate path of the source of power the emptied reservoirs formerly provided.

For many weeks the crews selected for this vital and difficult task underwent special training in as complete secrecy as could be obtained. They worked on a bomber station which, as far as possible, was cut off from any contact with the outside world, and only about half a dozen other men in the whole of Bomber Command knew what was afoot. Here it will be as well to emphasise that the story which got about to the effect that these dams were suggested as targets by a refugee from Berlin has been officially refuted. Bomber Command needed nobody to tell them of the significance of those dams, or to point out to them how worth while it would be to have a smack at them. But there were certain difficulties to be overcome if the attack was to have a reasonable chance of success at the first attempt and thus carry with it the great advantage of surprise.

FORTUNES OF WAR : Wing Cdr. A. H. Donaldson, D.S.O., D.F.C. and Bar, A.F.C., wearing the helmet split by a cannon shell which burst inside his Whirlwind cockpit.

In the early hours of May 17th, when weather and light were exactly right for the job, the Lancasters put the plan into operation. The crews knew how much depended on their success, for they were not likely to have a second chance if they failed. By the following morning all the world knew that they had pulled off one of the most brilliantly daring examples of strategic bombing the history of air warfare had ever known and had, in a single operation, inflicted as much damage on the German war machine in the Ruhr valley and on another industrial area further east as could have been done by thousands of tons of bombs dropped on many nights in succession.

Wing Cdr. Gibson himself led the attack on the Mohne dam, and after he had dropped his mines he flew up and down alongside the dam to draw the enemy *flak* away from his comrades coming along in support. Guns were poking their muzzles from slots in the walls of the dam itself and, as

he flew again and again through their barrage, his own gunners raked the defences so effectively that the German fire began to waver.

"A flight lieutenant who dropped his mines later," reads the official communiqué, "was in a better position to see what actually happened to the dam," and it goes on to describe it in the officer's own words.

"I was able to watch the whole process," he said. "The wing commander's load was placed just right and a spout of water went up 300ft. into the air. A second Lancaster attacked with equal accuracy, and there was still no sign of a breach. Then I went in and we caused a huge explosion up against the dam. It was not until another load had been dropped that the dam at last broke. I saw the first jet very clear in the moonlight. I should say that the breach was about 50 yards wide."

Another pilot said that the jets of water were so powerful that they were hurtling out horizontally for at least 200ft.

Repeated attacks were necessary to break down the dam thoroughly, and each successive crew displayed extraordinary coolness and persistence in the face of the defences, coming down as low as 100ft. or even less. "It was a magnificent piece of work and, while many humanitarians will shudder at the subsequent deluge which engulfed whole communities, the answer can only be that war is always inhuman, as the German bombers gratuitously demonstrated to the people of Warsaw, Rotterdam and a hundred other European and British cities.

DAM AND BLAST: The Möhne Dam before and after attention from mine-dropping Lancasters on May 17th. The breach, which is exactly in the centre of the dam, is approximately 200ft. wide.

WAR IN THE AIR

From Northern African airfields, the softening-up process has been going on with a relentless determination that must be making many Italians think hard about those leaflets dropped on Rome suggesting that a choice between capitulation and destruction has more behind it than mere propaganda.

Wellingtons of the Strategic Air Force have pounded Palermo, Trapani, the seaplane base at Lido de Roma, and the port and airfield at Alghero in Sardinia, to mention just a few of the more outstanding recent operations by these seasoned air veterans of the Mediterranean campaign. Flying Fortresses escorted by Lightnings have also blown up enemy shipping and plastered the docks and railroad yards at Trapani, and the harbour and airfield at Pantellaria have also been beaten up by medium bombers and fighter-bombers.

Long-range Beaufighters of the Coastal Air Force, patrolling over Italian waters, have gunned their ships and shot down a number of enemy fighters, mostly if not all Germans. And although the *Luftwaffe*, which left Von Arnim's men to their fate on the Bon peninsula, has tried to stage a somewhat shamefaced comeback during the past week or so, their losses at the hands of Allied fighters and the heavily armed Fortresses have been heavy, while our own have been remarkably light.

Italy's Plight

ITALY'S position for defence against Allied air attack, in fact, is now precarious to say the least of it, for, by some six months' systematic bleeding of the *Luftwaffe*, the North-west African air forces have achieved a supremacy which makes "carpet of bombs" tactics possible, and the Axis are now incapable of defending Italy from our air onslaught. Her *flak* has always been totally inadequate and her own night-fighters are practically non-existent. And since the very strong German day and night fighter and *flak* defences have failed to protect the industries of Germany, the danger to the comparatively unprotected industries of Italy is obvious.

Recent events in Tunisia have proved that the Allied Nations' Air Forces in the Mediterranean were outstandingly superior to the very considerable combined air strength of Germany and Italy in that theatre. The Axis lost at least four times as many aircraft in the North African campaign as did the Allies.

Having lost Africa and being now forced to operate solely from airfields in Italian territory, it seems unlikely that the Axis air forces will be able to achieve any greater success in the defence of Italy than they did in Africa. The *Regia Aeronautica* might, perhaps, be expected to operate more

ENEMY AIR LOSSES TO MAY 22nd

	Over G.B.	Con-tinent	Middle East	N.W. Africa
May 16	5	2	3	2
" 17	3	7	0	4
" 18	1	1	0	10
" 19	1	1	0	29
" 20	0	2	3	22
" 21	1	0	10	22
" 22	0	0	1	8
	11	13	17	97

Totals: West, 6,916; Middle East, over 5,336; North West Africa, 1,841.

vigorously in defence of its homeland than in Africa, but the total Italian air strength is so small and so technically inferior to that of the Allies that its best efforts, even in conjunction with the *Luftwaffe*, could not adequately protect Italy from Allied air attack.

Italy's most effective method of defending herself against Allied air aggression would clearly be to bomb the Allied airfields and bases in North Africa. Her fighters are neither numerous enough nor efficient enough to stop the Allied bombers, even when unescorted, from attacking Italy. Italy, however, has neglected bomber types. Her bomber force is small, and what bombers she has are obsolescent.

The Allied bomber force in North Africa is immensely superior, both numerically and technically, to that of the Axis. This was indicated clearly, for example, in the attack on Palermo on May 9, when Allied bombers attacked this port without loss, although this target is within fighter range of several Axis airfields. They dropped nearly as heavy a total tonnage as the German Air Force ever released upon London in a night.

Meanwhile, our Typhoons, Mosquitoes, Whirlwinds and Beaufighters of Fighter Command keep up their ceaseless intrusion upon the land and sea communications of the enemy nearer home, and Venturas and torpedo-carrying Hampdens of Coastal Command, the former generally escorted by Spitfires, have been giving no respite to his coastal airfields and shipping. Home-based Mitchells and Bostons, too, have been in action, and though all these operations have not been conducted without some loss, this is far less than the high percentage loss of Fw 190 fighter-bombers which have been making themselves rather a nuisance just lately over East Anglia and the outlying districts of London.

Big Enemy Losses

LAST week-end the losses of the *Luftwaffe* when it tried to protect its Mediterranean partner's airfields and ports rose to the impressive total of 272 machines in the space of three days; of these 70 were shot down in combat and reports of individual encounters again stresses the formidable defensive armament of the Flying Fortresses. There was, for example, the assault on the airfields of Sciacca, Castelvetrano and Borizzo in the west of Sicily.

The heaviest blows were directed against Borizzo, where the Fortresses were met by what is described as "a large number" of enemy fighters; it is significant that only Messerschmitt Me 109s were mentioned; there was no word of any Macchi 202s or Reggiani Re 2001s, which are Italy's best fighters. At all events, seven Me 109s were shot down in the ensuing scrap and of these six fell to the guns of the bombers and one to the escort of P-38 Lightnings. Additionally, nine enemy aircraft were destroyed on the ground —as shown by subsequent reconnaissance photographs—and considerable damage was done to buildings and stores near the arsenal.

Sciacca, on the south coast of Sicily's western tip, was the R.A.F.'s main target on the previous night. Wellington bombers started many fires among the hangars and administrative buildings, and also visited three other airfields, coming down very low to bomb runways and dispersal points. At Castelvetrano, one Wellington, after planting a well-aimed stick right along the flare path, swooped down to within 50ft. of the ground to get below the fairly strong *flak*, and got away with it. A daylight raid by P-40F Warhawks strafed the wireless station at Sanantioco, in southern Sardinia, and when Gen. Doolittle's Strategic Air Force attacked airfields in Sicily and Sardinia last Friday, the enemy lost 19 fighters in combat and 67 aircraft were destroyed on the ground, including a number of six-engined Me 323 transports.

BRITISH & U.S. AIR LOSSES to MAY 22nd

	Over G.B. A'crft.	Continent B'brs.	Continent F'trs.	Middle East A'crft.	N.W. Africa A'crft.
May					
16	0	9	3	1	3
17	0	16	4	0	0
18	0	0	6	0	7
19	0	6	1	0	4
20	0	0	1	0	1
21	0	17	4	0	7
22	0	0	0	1	4
	0	43	19	2	26

Totals: West, 6,082; Middle East, about 2,094; North West Africa, 690.

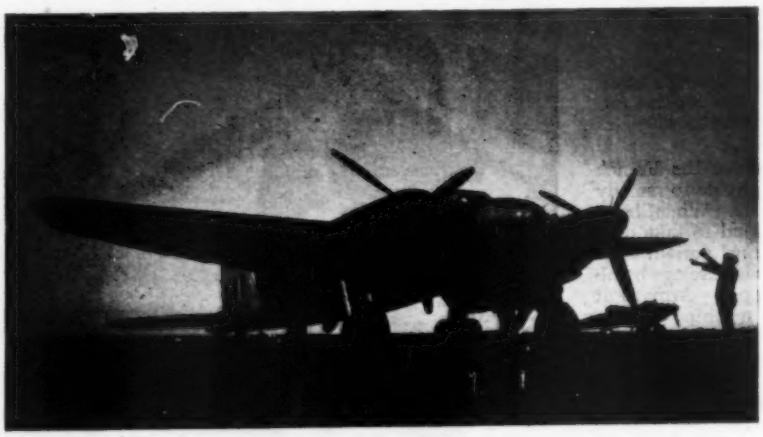
U.S.A.A.F. DEVELOPMENT

A NEW European wing of the Air Transport Command, U.S. Army, has been set up with Colonel Paul E. Burrows as Commanding Officer. Originally the Command dealt with the problem of delivering military aircraft manufactured in the United States to Great Britain. Its function is now broadened in that aircraft are delivered to U.S. Air Force units wherever they are fighting. Furthermore, the air transportation of critical cargo, mail and personnel is consolidated under the Command. Bases have been and are being established as well as facilities for handling a vast flow of aircraft and essential supplies, and they will be used jointly by the U.S. Air Transport Command and the Royal Air Force Transport Command.

At the terminal points mechanics and other specialists will be employed to check aircraft received by sea ways before they are handed over to the Air Force units to which they are assigned.

Colonel Burrows said: "You may have noted a recent announcement concerning the construction, for Air Transport Command and Royal Air Force Transport Command operations, of the largest airfield in the world in Labrador, on the Great Circle air route to the United Kingdom and Europe. A vast increase on the number of aircraft that went through there in 1942 is expected this year.

"In the European Wing we are making arrangements to receive these aircraft, and many others that will fly over different routes. It is no small task. It requires numerous bases and installations. It requires a large organisation—how large, I am not permitted to say. It is all a part of a vast military undertaking, shared in by the Allied nations, to bring the war home to Hitler as speedily and forcefully as possible."



MOONLIGHT MENACE: Mosquitoes of a night "intruder" squadron just before take-off.

Tunisian Day-bomber

Pictures from a Boston Station in North Africa : Tedder's Attack-bombers Turn Their Attention to Southern Italy

DEVELOPED in many ways from experience gained on the various war fronts, the Douglas DB.7 (Boston) has proved to be one of the outstanding aircraft types of the war. In the recently completed North African campaign the Boston squadrons have done great work from El Alamein to Cape Bon. Now, doubtless, they will carry on their work across the Sicilian Straits until the day dawns when they will be operating from European airfields once more.

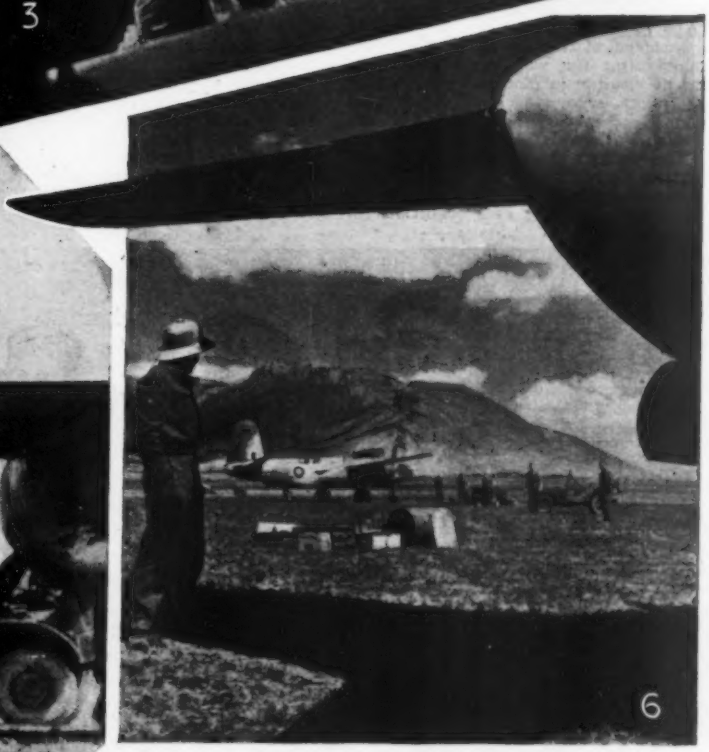
1. Time to write a letter home while waiting for the start-up signal.

2. Ground crews wait for the retur... the squa... devotion to duty which keeps the Bosto... the "ser... the fixed armament the Boston no... a gimba...

Originally the DB.7 was in production for the French Air Force, when a vain attempt was being made to remedy the lack of output from the French factories. When, however, France collapsed in 1940, we were glad to take over the contracts to tide us through an awkward period.

The Boston III carries its load of bombs in fuselage bomb racks and has a top speed of some 300 m.p.h. Armament in the early models comprised two fixed machine guns in the nose and a single free gun protecting the tail. This fire power has been more than doubled in the front and quadrupled in the rear. In its present form the Boston is a very useful type and is doing good work.

In the American Air Force the Boston is classified as an attack bomber and differs but very little from the R.A.F. version.



...the squadron from operations. It is their ...the "serviceable" list. 3. In addition to ...s a gimbal mounted Vickers K gun.

4. Refuelling the wing tanks. The engines are Wright Double-row Cyclones giving 1,600 h.p. for take-off. 5. Loading the bomb racks which are just behind the space occupied by the retracted nose wheel. The hatch gives access to the rear gunner's cockpit. 6. The Boston in the background is a modified type. There is no drop behind the rear turret and it has no curved fairing between the fuselage and the fin.

HERE AND THERE

To Prevent Sunburn

TO protect pilots and other crew members from severe sunburning during prolonged flights at high altitude, sheets of transparent plastic that obstructs the passage of ultra-violet rays are now being used for the construction of aircraft noses, wind-shields and gun turrets, according to a report from America.

U.S. Machine Tools

SWEEPING reduction in the output of new war plant and machine tools has been ordered by the U.S. War Production Board. The bottle-neck having been broken, it has been decided that some makers of machine tools should turn their attention to the direct production of munitions.

De Valera at Shannon Airport

THE Eire Prime Minister, Mr. Eamon De Valera, paid a four-hour visit to the Shannon Airport recently. He was received by the airport manager, Colonel Patrick Maher, and officials of the companies operating from Foynes.

After an inspection of the base and airport offices Mr. de Valera and the officials were entertained to lunch.

Airline Pilots Affiliate

AN affiliation agreement designed to safeguard the interests of airline pilots after the war was signed at a recent meeting in Montreal attended by 14 pilots who, together, represented almost all the airline pilots of the United Nations.

The agreement, which covered such matters as public safety, maintenance of standards, rates of pay, flying hours, standards of living and conditions of service, was signed by David Behncke, president of the Airline Pilots Association of America; Capt. Richard Allen, representing the British Airline Pilots Association; and Capt. R. E. Hadfield, president of the Canadian Airline Pilots Association.

Besides protecting the common interests of airline pilots of the United Nations, the seven-clause agreement aims at further safeguarding "the best interests of national and international airline transportation."

Sir A. Dunbar Returns to Vickers

SIR ALEXANDER DUNBAR is to return to active duties with Vickers-Armstrongs, Ltd., at the company's request, Sir Stafford Cripps having agreed to release him from the Ministry of Aircraft Production.

It was two years ago that Sir Alexander Dunbar joined M.A.P., serving first as Director-General of Materials Production, then as Deputy Controller General, and later as Controller General and a member of the Aircraft Supply Council.

Thunderbolt Data

SINCE the article on the North American Thunderbolt, now operating in this country, was published in last week's issue of *Flight*, certain additional facts about its performance have been released for publication which were withheld at the time.

During the demonstration witnessed by *Flight*, the interval from the start of the take-off run to the moment the Thunderbolt became airborne was 14 seconds, and the time required for complete retraction of the hydraulically operated undercarriage was ten seconds. Approach speed during the landing was in the region of 115 to 120 m.p.h., and the final touch-down was made at 90 m.p.h.

Reception to Maj. Gen. Eaker

IN honour of Maj. Gen. Ira C. Eaker, Commanding General of the 8th Air Force, U.S. Army, and a hundred members of his staff, a reception was given by the English-speaking Union at Dartmouth House last week.

Guests were received by Air Chief Marshal Sir Christopher Courtney, K.C.B., C.B.E., D.S.O., and Lady Courtney, and the Hon. Mrs. Alfred Lyttelton, G.B.E., Chairman of the English-speaking Union. Many members of the Air Ministry and well-known personalities in the aviation world were present.

Science on Celluloid

THE English Scientific Film Association has recently been formed. Its inauguration took place at a meeting convened by the Scientific Films Committee of the Association of Scientific Workers, at which Mr. Arthur Elton presided. The new body, he said, would be independent and self-governing.

With the object of furthering the general appreciation and use of the scientific film, especially in relation to social progress, it is possible that a reference library may be set up and a journal published.

Air Routes Over N.W. Canada

REFERRING recently to the chain of airfields built by the government from northern Alberta to Alaska, Mr. Mackenzie King, Canada's Prime Minister, said that a comprehensive survey by the authorities would disclose great possibilities for practical development between the Mackenzie River and the Alaskan boundary.

With this fact in mind, Brig. W. W. Foster had been appointed special commissioner for defence projects in northwest Canada, and his duties would be to supervise and co-ordinate the wartime activities of government departments in the area and maintain co-operation with all agencies of the U.S. Government there.

Strategic Airport

AN airport, lying north of the Atlantic air routes and described as the largest in the world, has been developed for strategic purposes, according to the Canadian Department of Transport. Costing to date approximately £3,000,000, the airport is for the use of the R.C.A.F., R.A.F. Ferry Command, and the U.S. Army Air Transport Service.

The runways are more than a mile in length, which means fully loaded Lancasters and Flying Fortresses can take off from the airport, and allowance has been made for extending them into the sand plateau on which the airport is built should this become necessary later.

Apart from the airport's immediate value for war purposes, it will probably have an important place in world flying when the war is over, since it is on the "Great Circle" air route to Europe and has good weather nearly all the year.

COMBINED OPERATION: A British and a Fighting French fighter squadron operating together has bagged its 1,000th Hun, who was shared by Sqn. Ldr. J. Charles, D.F.C., and Commandant Rene, D.F.C. (Left to right) Sqn. Ldr. Charles, Commandant Rene, Group Capt. A. G. Malan, D.S.O. (their C.O.), and Wing Cdr. Alan Deere, D.F.C. and Bar; they hail from Canada, France, South Africa and New Zealand respectively.

Singles to Twins

A Transition Which Forms a Landmark in the Training of a Pupil : Importance of Cockpit Drill : Engine Synchronisation

TO the young R.A.F. cadet now harnessed to a full and very vigorous pilot's training course, first impressions count for a very great deal. No impressions are so indelibly imprinted upon the mind as the first flight in an aircraft, and, later on, the first solo flight after what, in an eager young man's estimation, has been a century in time, but according to the calendar is but a relatively short period.

For practically all instruction in the earlier stages of flying, single-engined machines are used, whether biplanes or monoplanes, because, apart from the fact that such aircraft are cheaper to build in very large numbers and easier to maintain in flying order in the somewhat hectic life of a training unit, a single-engined machine is more simple to fly than a twin, for a variety of reasons.

First and foremost, we have the one engine mounted at the front end of the machine, with the pull of the airscrew passing directly rearwards through the fuselage. The pilot is seated well to the rear, and, being directly in line, fore and aft, with the engine he can easily sight the airscrew arc, and the general layout is such that the young pupil can sensibly adjust himself to his precise location in the aircraft. During flight he can easily see the wings on either side of the fuselage and their angular relation to the horizon, or the earth below, while the nose of the machine can be readily sighted in relation to the horizon ahead, affording visual facilities which are necessary during the basic training of a pilot.

Single-engined Control

Secondly, a single engine requires the minimum amount of control on the part of the trainee, being limited to the correct use of the throttle, switches, etc., whilst taxying on the airfield, or when in the air, and as, in any case, the pupil has to be trained to be engine-minded, it is much easier to accomplish this with a single engine than with two.

Basic training on Moths and more advanced flying instruction and experience bring the young pilot up to single-engine Harvards and other aircraft of a similar type until he arrives at a stage when the first section in instruction is ended. The pupil may then continue with single-engine aircraft for specialised training for fighters, or, alternatively, may pass to twin-engined aircraft for advanced instruction preparatory to becoming pilots of the bigger aircraft of the bomber or reconnaissance types.

The change from single-engine to twin-engine machines forms almost a landmark in the cycle of impressions to the pupil who has been accustomed previously to relatively simple aircraft. The technique of flying, as learnt in the earlier stages, remains unaltered, but the pupil has to orientate himself in a machine which is fundamentally different in several important ways, and he goes through a phase which is almost as memorable as his first flight.

Change of Aspect

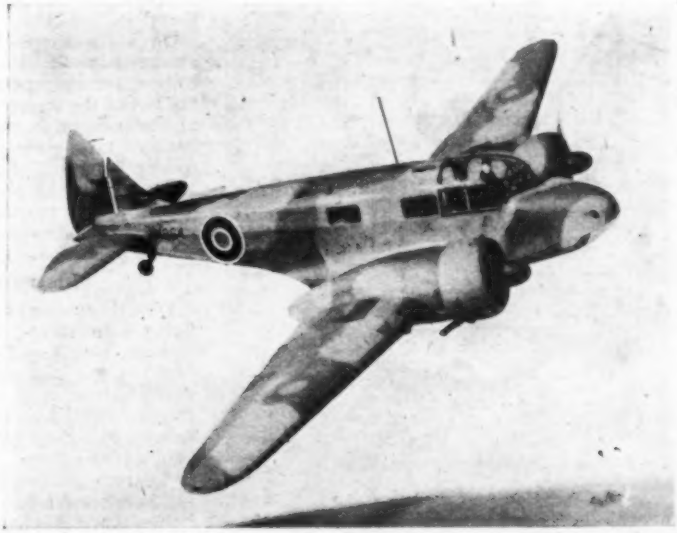
It is not difficult to realise that the first important difference in flying single- or twin-engined machines is that the twin engines introduce an entirely different set of conditions to be considered when the machine is handled on the ground or in the air. Not only have the engines to be operated as an integral part of the flying of the machine, but they have also to be nursed together as a pair through the various controls and instruments.

The next important change is that, whereas the pilot is seated well behind the engine in a single-engined machine, with a fair amount of the aircraft well within the angle of vision from one wing to the other, the pilot in a twin-engined machine is seated in a cockpit in the nose of the fuselage and has none of the aircraft ahead of him except the windscreen and instrument panels. There is thus little of the aircraft on which visual sighting can be done against the horizon or cloud layer, and the pupil taking his first flight, after single-engine flying, has to readjust his sensory reactions on a more or less new basis.

Again, the somewhat violent change in the location of the pilot in the aircraft introduces a new set of conditions when taxying, as the pilot is raised considerably in the nose of the machine and has to look sideways out of the cockpit to watch his wing tips. On the other hand, the forward view from the cockpit with the aircraft in level flight is enormously improved, and the width of the cockpit, with its side-by-side seats, gives a sense of greater comfort and roominess.

A third factor, which will represent a considerable change-over for the pupil, is that the engine and other controls are in the centre of the cockpit and not on the left-hand side of the pilot. Thus, there is a reversal of duties for each hand of the pilot, and the alteration has to be watched with some care during preliminary instruction in taking-off or landing.

During the early period of flying instruction in the R.A.F., a great deal of ground work is covered on engines and aircraft, and it is all strictly related to the actual flying work done by the pupil at the time. When the pupil is transferred to twin-engined aircraft, a period of ground instruction is given specially for that type



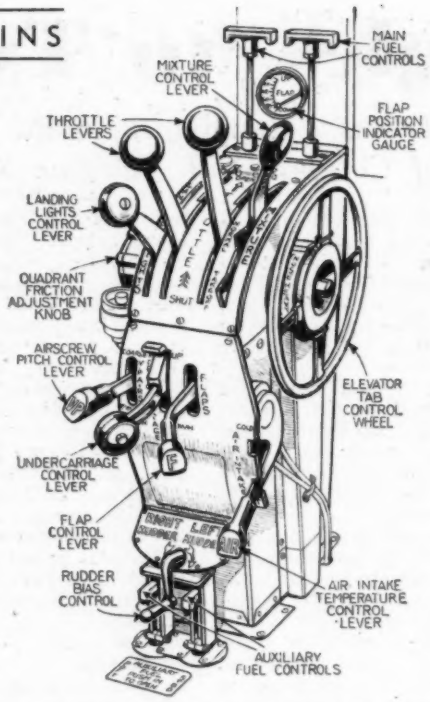
Side-by-side seating for pupil and instructor is essential for instruction with multi-engine aircraft; hence the wide cockpit on the Airspeed Oxford. Despite the excellent all-round view from the cockpit, the pupil has to accommodate himself visually to the lateral restrictions created by the twin engines, nacelles and wings, after flying single-engined aircraft.

SINGLES TO TWINS

of machine, and cockpit drill forms an important section of that course. This drill is concerned with the sequence of vital actions in taxying, take-off and landing, and the pupil is thoroughly habituated to these actions before flying instruction is begun, with special reference to the handling of multiple engines in synchronisation, economy in running, mixture strengths, etc.

After this course of ground training, the pupil begins flying, with an instructor, on a machine which is likely to be an Airspeed Oxford (the instruments and controls of which are indicated in special illustrations); the pupil and instructor sit side by side, with the main control pedestal in the centre.

Now, the pupil who has reached this stage of beginning to fly an Airspeed Oxford will need little tuition on the ordinary flying controls (change over to wheel-type aileron control from joystick) and standard instruments such as the A.S.I., artificial horizon, turn-and-bank indicator, and so on, but the controls and instruments relating to the twin Cheetah engines loom up as very special items.



The control pedestal of the Airspeed Oxford. The positional relationship of two important groups of levers, throttle and mixture levers, and airscrew, undercarriage and flap levers will be observed. The flap position gauge indicates the angle of the flaps in degrees.

Independent Operation

Perhaps the most significant point about the engine controls is that the two engine throttle levers are not connected together for the joint control of the engines, but are independently operated by the pilot when taxying, taking-off, or in normal flight. The pilot's fist, grasping the knobs of the two levers, can give a differential movement to the throttles, if the aircraft endeavours to swing on take-off, and, of course, the engines have to be synchronised when the machine is air borne. The two R.P.M. indicators are a rough guide for synchronisation, but the sound and feel of the engines are more important as a check on smooth running and balance during flight.

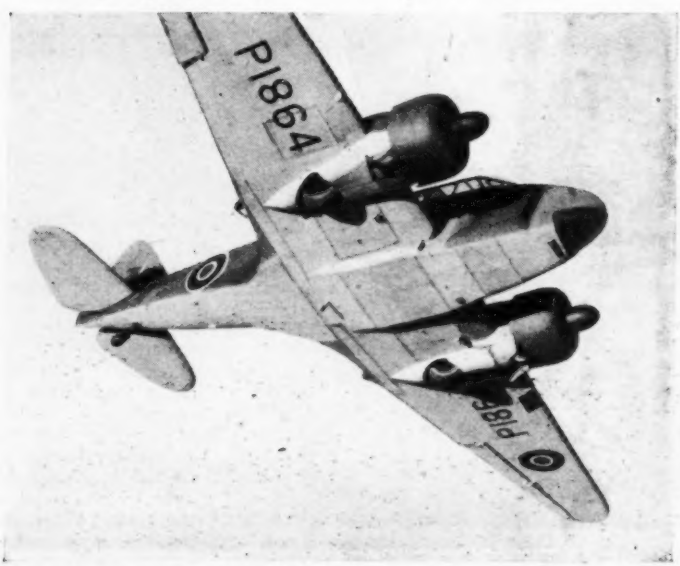
On the relatively short flights while under training, engine synchronisation may seem unimportant, but early training is not so concerned with the machines the pupils are flying as with the types that they will fly on operations, and the eternal "Thrum-Thrum" of badly synchronised engines, maintained hour after hour, imperceptibly beats into the pilot's brain and blunts its keenness and can even cause air sickness, to which sea sickness is a mild indisposition.

There are times when miles-per-gallon is even more important to a pilot than to a car owner; a motorist has merely to wait till his next ration period starts. So pupil pilots are taught how to nurse their aircraft along economically so that in emergency they will have that little extra juice which may mean their very lives.

The training aircraft do not ascend to the heights where icing conditions prevail, but they are taught the symptoms of a carburettor that is icing up, and also how to use the hot air intake of the carburettor to avoid it.

Instruction is given on flying and approach on one engine only, in which case only one of the throttle levers will be operated, although the other is immediately available, in emergency. On the right-hand side of the throttle levers on the control pedestal is the mixture control lever, while on the left-hand side is the lever for controlling the beams of the landing lights. On the front vertical face of the pedestal are the levers for operating the undercarriage, flaps and temperature of the air entering the carburettors.

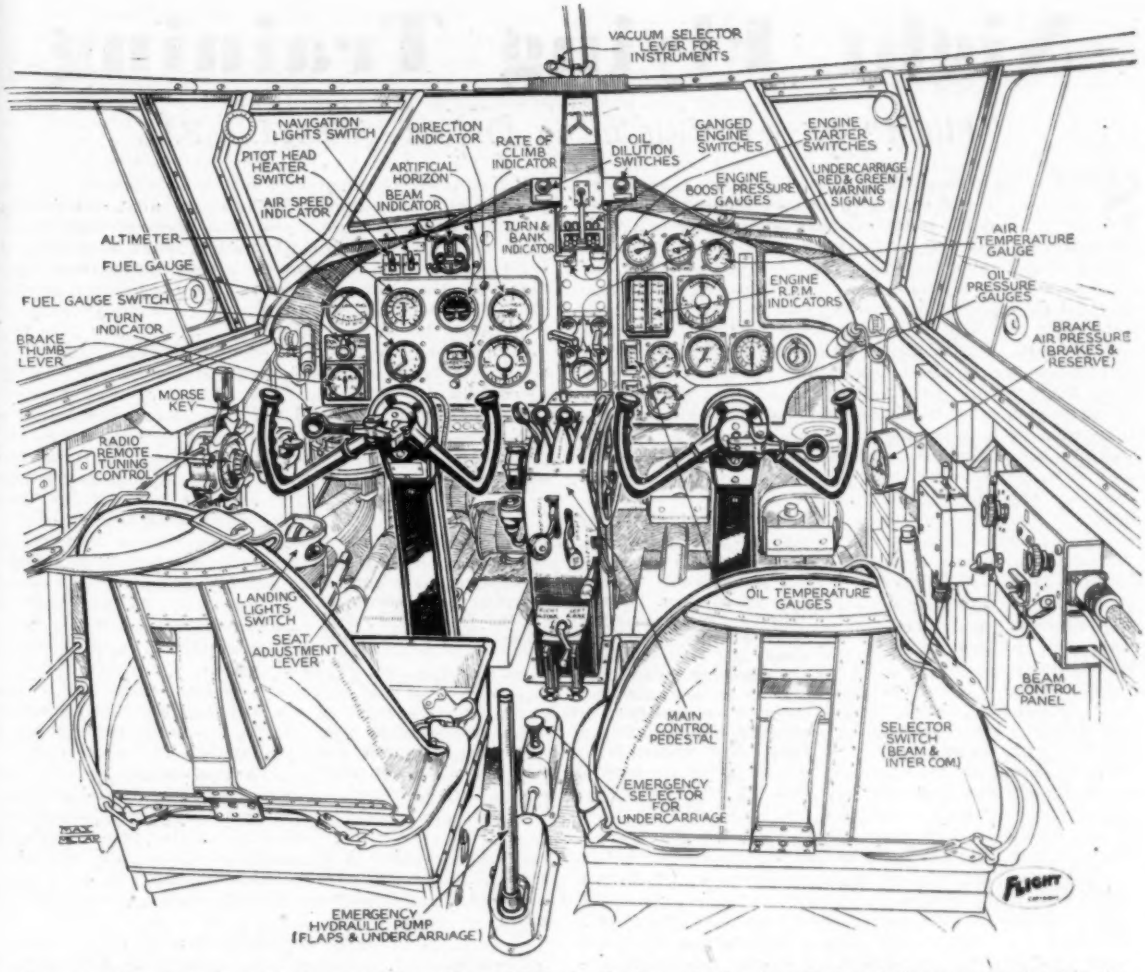
On some Airspeed Oxfords, variable pitch airscrews are fitted, and in that case, an extra control for the operation of these is fitted to the left of the undercarriage lever. At the side of the pedestal is the wheel for operating the elevator tabs, and at the base, the handle for rudder bias and also the auxiliary fuel tank controls. On the pedestal near the instrument panels are the two main fuel controls and also the gauge indicating the angle of the flaps during operation.



Synchronisation of engines and economy in fuel are important items in flying instruction with the Airspeed Oxford. The moderately supercharged Cheetah engines are admirably suited for this purpose.

Instrument Layout

Directly in front of the pupil are the normal flying instruments, beam approach indicator, and navigation and pitot heater switches. In front of the instructor are certain duplicated flying instruments, and also the r.p.m. indicators, twin oil pressure and temperature gauges, and dual boost pressure gauges, easily seen by the pupil. Between these two sets of instruments is a narrow vertical panel with the undercarriage red and green warning lights, various engine switches, and, above, the vacuum selector lever for operation of certain instruments. To the left of the pupil is the radio remote control, Morse key and landing light switches, while the compass is located on a tray just below the pupil's in-



The main flying controls and instruments of the Airspeed Oxford. Engine and other important controls are on a pedestal in the centre of the cockpit—an important variation from those on the single-engined trainer. The pupil is seated on the left and instructor on right.

strument panel. The brake air pressure gauge, beam control panel, and other items are on the instructor's side of the cabin, and between the seats is the emergency hydraulic pump and selector for the undercarriage and flaps.

Entrance and exit is very easy on the Airspeed Oxford as the trailing edge of the wing with its step place is near the ground, and the car-type cabin door does not hamper a pupil in flying kit in getting in or out of the machine. Sliding cockpit windows and controllable ventilation is provided, and in bad weather, small windows can be opened to give good visibility on take-off or landing.

The whole subject of efficient engine control is studied thoroughly on this flying course, with considerable emphasis on fuel economy and the life of the engines. At the same time the Oxford is an aircraft which needs competent flying and, with the many extra sections of the instructional course such as navigation, night flying on compass course, radio beam approach, radio communication and blind flying, the pupil enters a new phase of his career as a pilot.

The Link trainer is very freely used during the ground and flying courses, not only for instruction in flying by instruments, but also for navigation on cross-country routes with very accurate checks.

Flying and landing with one airscrew feathered gives the pupil valuable experience and confidence in handling in an emergency, should one engine fail.

Night Flying Training

"Flight" Pays a Visit to an Oxford-equipped A.F.U.

SINCE a high proportion of "multi-engine" pilots are destined to find their way into the bomber squadrons of the R.A.F., it follows that night flying is a very important part of the instructional work in an Advanced Flying Unit, and if there are a number of significant differences between flying a single-engined aircraft and one powered by two engines (not to mention four) then there is a whole world of difference between flying in normal daylight and flying at night. Bright moonlight may, when Nature elects to provide such illumination, reduce the difference to some extent, but even so the pilot depends far more upon what he can see and hear inside his "office" than what he may be able to discern beyond the Perspex windows of the cockpit. Landmarks, including his target, may or may not be recognisable checks upon his compass, for the slightest ground haze will effectively smudge them out, and even a good moon is no fair exchange for the light of day when it comes to gauging his final approach to the runway, and judging a nice three-pointer.

Thus *Flight's* representative found a visit to one of the R.A.F.'s best-equipped A.F.U.s of more than ordinary interest, for this particular station, laid out before the war amid some of the loveliest country in Great Britain, has a reputation in the Command it serves for the high efficiency of its night flying—a reputation which it is patently doing its best to keep. To this unit come pilots who have gained their wings in one of the Dominions, so that in addition to night flying they are acclimatised to the very much less helpful weather conditions of Northern Europe, and it is the boast of this A.F.U. that only the worst of weather is allowed to interfere with night flying; potential bomber and night-fighter pilots must know how to deal with unfavourable "met."

It has already been indicated that this particular A.F.U. lacks nothing in modern instructional equipment. Beam approach flying is taught, and men from operational squadrons often lecture the pilots to give them first-hand "gen" on what to expect over enemy territory. Some of their own instructors, too, are ex-operational and can give useful advice on this vital point.

The Syllabus

The pupil pilot begins his night flying when he has passed certain tests in day flying on the Airspeed Oxford—the standard advanced twin-engined trainer used at this station. Night work begins with "circuits and bumps" with an instructor; then follow short cross-country flights, also dual, during which stress is laid on such things as what sort of cloud to avoid, alertness for other aircraft, familiarity with the meaning of various airfield lights and other special night signals, and what to do if he ever gets lost. When the instructor is satisfied that his pupil can safely be trusted to cope with all the main emergencies of the night, he is sent solo.

By this time the pupil is a fairly proficient night pilot and he passes on to long cross-countries, probably with several "legs," until he can be relied upon to stay in the air for several hours of darkness and find his way home safely. In short, he arrives at the A.F.U. with a brand new pair of wings on his tunic, but when he leaves for an operational unit he can really fly!

THE preceding article deals with the initial instruction of newly qualified pilots on joining an Advanced Flying Unit—that of transitional training from single-engined aircraft to twin-engined types. This article, written by a member of "Flight's" editorial staff, after a visit to an A.F.U., deals exclusively with the subsequent stage in the pilot's career, namely that of night flying.

A considerable proportion of the A.F.U.'s night-flying pilots pass on to operational bomber squadrons, some find their metier in our night-flying Beaufighters, while others may be entrusted with reconnaissance or patrol duties involving night flying. Final training on the actual types of aircraft they will fly against the enemy is given after they have joined their operational squadrons.

Incidentally, the instructor leaves as much as possible to the pupil pilot during his hours of dual, intervening only now and then to give a word of advice on some point, or if his charge gets into difficulty. What is equally—if not more—important, however, is that during their night flights together, the instructor is able to get a good general idea of his pupil's ability, and to assess the type of operational duty he will be likely best to carry out. On this assessment may well depend whether the pupil ultimately becomes a bomber pilot, a night fighter, or a reconnaissance pilot.

It is hardly necessary to add that ground instruction is also included in the pupil pilot's course. He learns the procedure of laying out the flare path, he takes turns during the night as flight control officer, signalling take-offs and landings with an Aldis lamp, and gets practical experience at a number of other routine jobs on the airfield, familiarity with which all helps to achieve the unit's sole aim—the creation of the compleat night pilot.

Before dark, the cross-country pupils are briefed in much the same way as bomber crews are briefed before setting out for the night's target, and this was where *Flight* made first contact with the activities of the A.F.U. visited (if one excludes the friendly reception by the liaison officer at a small country railway station and the cheerful hospitality in an extremely well-ordered mess).

In the Briefing Room

There was an air of informality about the group of young pupil pilots, gathered around the big table in the briefing room, that accentuated the obvious seriousness with which they took their job; the lanky, red-headed sergeant-pilot, for instance, who, pipe in teeth and notebook in hand, perched himself easily on the table's edge, had a studious expression on his fresh-complexioned face as he carefully jotted down the remarks of the met. officer, the navigation officer and the flight control officer—"light wind, haze but no cloud, moon—tell radio operator when reaching turning points—check wireless as soon as airborne; if lost, orbit and carry out normal distress procedure, etc., etc." Names were called out for the night's details, those for the short and those for the long cross-countries, and the precise time given for reporting to the night-flying office.

After briefing, the pupil pilot works out his course, and this is checked by his instructor. As dusk closes down over the airfield, Cheetah engines can be heard warming-up; navigation lights on the dispersed Oxfords dot the night with white, green and red pin-points, and here and there a red marker blinks its warning from a distance. In the night-flying office the pilots get a few last-minute words of advice, and up in the control tower the flight control officer is at his post, checking up a dozen-and-one details while an alert W.A.A.F. holds cryptic converse over the R/T. From a control panel the Drem lighting system is brought into action, but the flare path is only visible from the actual take-off position on the field.

There are several runways on this school's airfield, and the slight breeze on this occasion allowed the main one to be used. For some time we watched the Oxfords taking off, only their tail and port lights visible from the control tower as they swept across the airfield, so that it gave the

impression of a white light pursuing a red one with a determined roar. But as each Oxford rose into the air, well before the end of the flare path, the whole aircraft came into sight, silhouetted against the luminous sky.

Having duly observed that pessimistic formality known as "signing the blood chit," we left the control tower to gather up a borrowed Irving and flying helmet, for we were to accompany the unit's chief flying instructor, a youthful D.F.C. wing commander, on a tour of inspection of two satellite airfields belonging to the school. The Irving was, of course, in obedience to the inflexible R.A.F. rule that nobody flies without a brollie, but the flying hat was needed for its inter-com. facilities and not for warmth; the night was mild and we were not going up to any great height—moreover, the Oxford has a cabin heater.

The Invaluable Instructor

The "wing co" took as his second pilot a squadron-leader who in peacetime was chief instructor to a very famous flying club and is now doing a valuable job of work in the same line of business, as are all R.A.F. flying instructors. In fact, it would be hard to exaggerate the supreme value of these experienced men, but more about that later!

Now, the third seat in an Oxford is about half-way back in the cabin and faces to the rear. The notorious characteristics of a journalist being a thick hide and a highly developed degree of nosiness, we disdained the comfort of the third seat and sat on the raised cabin floor above the centre-section, with the editorial feet in the well of the cockpit. From this advanced position immediately behind the two pilots we had quite a good view, and now and then borrowed the squadron-leader's inter-com. socket to exchange a few words with the pilot; normal conversation is hardly possible in an Oxford with a couple of Cheetahs bellowing away a couple of feet or so from each ear!

With high-pressure instructional flying going on, especially the numerous "circuits and bump" pupils, there was a certain amount of traffic congestion around the approach to the flare path, but in due course our turn came, the Aldis winked its green-eyed approval from the control tower, and we were off, sweeping between the parallel lights of the flare path and rising into the night sky. It has already been mentioned that even a slight haze can more than compete with bright moonlight, and although the earthbound mortal would have looked up and around and pronounced it a truly marvellous night, experienced eyes would have detected, even on the ground, a certain lack of definition in the outlines of distant objects. Once in the air there was no doubt about the haze, for at just over 3,000ft. the ground below was quite invisible and, where the horizon might have been, a dark nothingness save for the occasional glimpse of a red beacon flash. Above the transparent cabin top the moon and stars shone brightly in a dark purple sky, and their light put a dull sheen on the tops of the nacelles and the wings. Between the heads of the pilots the complex array of dials glowed green, and we suddenly appreciated to the full their importance and, in consequence, the value of the patient instructors who teach fledging pilots to understand and use them.

Eventually the lights of our first port of call became visible, and in response to our signal an Aldis flashed us permission to land. When the wing commander had received his report from the athletic Australian flight lieutenant in charge of this satellite school—and expressed his satisfaction with its progress—we adjourned to the mess, which is shared by all ranks on night duty here, and enjoyed a perfectly cooked meal which you may call late supper or early breakfast as you please.

Then once more into the waiting Oxford; again that rush down the flare path and the earth once more disappeared. At the second port of call the airfield lighting was of a more primitive nature—little else besides the actual flare path—but within the "business offices" everything was in apple-pie order.

Hospitality to nocturnal visitors seems to be a point of honour at all R.A.F. night-flying stations, for while the wing commander talked to the officer in charge, an airman appeared with three steaming cups of cocoa—*Flight* felt it was doing rather well at an hour when we are usually sound asleep!

Up-to-date Lighting System

Then back to the A.F.U. By now the haze had practically gone and the ground was dimly visible all the way. Now we had an opportunity of appreciating the qualities of the Drem lighting system—which may not be described in detail—for by its aid even a novice like ourselves could see the right way down to approach the flare path. And as our Oxford made its straight approach we saw also the value of the glide-path lamps which flank the beginning of the flare path. These lamps are so devised that while the pilot holds to the correct gliding path they show him a pair of coloured lights. Should he be too high or too low he will see lights of other colours. The squadron-leader instructor was piloting, and the reassuring pair of lights remained steadily visible all the way in; only when we were within a few yards of them did a glimpse of white peep momentarily from below the "safe" colour; it was a perfect approach and a perfect landing.

Finally, just a word about flying instructors in general. Theirs is a routine job that brings no glamour and few if any thrills. But, as we have said, its value to the war effort cannot be over-estimated. For they are the men who made it possible for "The Few" to win the Battle of Britain; it is they who create from ordinary young men out of offices, factories, and all the other everyday walks of life the skilled pilots who are carrying the war home to the enemy and beating him. It is not too much to say that without your instructors there could be no R.A.F. and no Fleet Air Arm. That is worth thinking about.

New Directors for B.O.A.C.

Lord Knollys Chairman and Air Commodore Critchley Director-General

SOME consternation was caused in the House of Commons on May 20th, when Sir Archibald Sinclair announced the appointment of a new chairman and a new chief executive for the British Overseas Airways Corporation. The Air Minister's announcement was as follows:

"It has been my intention, since the resignation of the late members of the British Overseas Corporation, to appoint a chairman who could devote his whole time to that important office. I have invited Viscount Knollys, the present Governor of Bermuda, to be chairman of the Corporation, and he has accepted. In order to take up this appointment, he has tendered his resignation as Governor, which resignation His Majesty has been graciously pleased to accept. Lord Knollys, who has agreed to sever his business connections, will start his new duties at an early date. His appointment will be for a period of four years.

"I am also appointing as members of the Corporation Miss Pauline Gower—(cheers)—Commandant of the Women's Air Transport Auxiliary, and Air Cmdre. Critchley. After consulting Lord Knollys, the members of the Corporation have selected Air Cmdre. Critchley for the post of chief executive. Air Cmdre. Critchley, who will now cease to be employed on the active list, will take up his new duties immediately. He will, of course, devote his full time to the service of the Corporation to the exclusion of other business activities. Sir Harold Howitt, who has discharged the duties of temporary chairman with conspicuous zeal and ability, has accepted my invitation to become deputy chairman, in which capacity his knowledge of public and business affairs will, I am glad to say, continue to be available."

Lord Knollys was appointed Governor of Bermuda in 1941. Air Comdre. Critchley had business experience of cement and greyhound racing before he became Air Officer Commanding No. 54 (Training) Group. Miss Pauline Gower has been commandant of the Women Pilots' Air Transport Auxiliary since 1940.

Behind the Lines

Service and Industrial News from the Inside of Axis and Enemy-occupied Countries

Slovak Airline

ACCORDING to a report from Bratislava, the first Slovak air service, which is to operate three times a week between Presov (Eastern Slovakia) and Vienna via Bratislava, was formally inaugurated on May 15th.

From France

WITH the exception of six plants, aircraft works in Southern France which had to close down on January 5th have again resumed production. While the real reasons for the suspension of work are still not known, the official explanation states in a somewhat ambiguous manner that it was due to a shortage of electric power. Among the six works which have not resumed production are the Hispano-Suiza branch works at Toulouse and the Ratier plant at Jurançon.

Regia's Loss

BRIG.-GEN. ENRICO PEZZI, who commanded *Regia* units on the Russian front (*Commando Aviazione Fronte Orientale*) is missing from an operational flight. Gen. Pezzi was 45 years old, served as an artillery officer in the last war, and has been with the *Regia* since 1926. At the beginning of this war he commanded a bomber unit in North Africa, and in February last was promoted and transferred to the Eastern Front.

Incidentally, he was the brother of Col. Mario Pezzi, who gained the altitude record in 1938 in a Caproni 161 bis aircraft.

Dumb Hun

IN an article in the *Hamburger Fremdenblatt*, addressed to readers at home, Oberleutnant Freiherr von Gleichen-Russwurm gives the following instructive picture of the mental condition of German soldiers coming home on leave from Russia: " . . . do you still remember how in the first two years of the war we came home from Poland, Norway, France and, finally, from the Balkans? We appeared then to you mature and confident when we were telling you of our experiences, of the happiness, of the beauty and enthusiasm, hinting only at the serious and terrible things. And now again we come on leave, *but we are monosyllabic, often mute.*

" *'Just as then' . . . say many of you in fear, and you think of our fathers who carried the gruesome experience of the battles of the last war.*"

Aces, Decorations and Losses

ACCORDING to the German Press, a number of *Luftwaffe* "ace" pilots—"Oak Leaves Holders"—were on service in Tunisia. Among them was Major Muencheberg, credited with 125 victories and recently reported killed in action. In connection with R.A.F. operations over Germany the names of night-fighter pilots are given increased publicity.

Major Hellmut Lent, 25 years old, is said to be the first night-fighter pilot with 50 aircraft to his credit. He fought in Poland, Norway, in the battles for Narvik, and in the campaign against France. Oberleutnant Gildner, 29, a night-fighter pilot, now reported killed in action, was originally a member of the Richthofen Squadron, and a holder of the Oak Leaves to the Knights Insignia of the Iron Cross. According to the German citation he was the first *Luftwaffe* man to score a night victory.

Major Werner Streib, commander of a group of night fighters, is awarded the Oak Leaves for his 40th victory. He is said to be one of the oldest and best German night fighters.

On the Russian front several awards of the Knights Insignia to the Iron Cross are announced: Lt. Wilhelm Doring, an observer in a *Kampfgeschwader*, who has carried out 380 operational flights against Poland, France and this country, for a difficult operation in connection with supplies for encircled German units at Velikie Luki; N.C.O. Werner Weihranch, a Stuka pilot, credited with the destruction of gun emplacements in Fort Stalin, at Sevastopol; and C.O. Paul Langkopf, 28, a Stuka pilot.

General Pezzi, late C.-in-C. of Italian Air Force units on the Russian front, and Marshal Messe, now a prisoner in this country.

Finally, the same decoration is posthumously awarded to N.C.O. Karl Mueller, a pilot in a *Kampfgeschwader*, decorated with the Iron Cross in October, 1942, who served in different campaigns, and is now reported missing from an operation, presumably against this country.

Farman Revived

IN spring, 1941, the Farman family created a new company, *S.A. des Avions Farman*, to compensate them for the old "*Avions H.M.D. Farman*," which had disappeared during the nationalisation period of the aircraft industry. It is now reported that the revived Farman company has acquired the Rosengart Motor Works in Paris. The technical management of the new factory is entrusted to M. Coquelin, a former director of Farman, and the commercial administration has been taken over by Jean Brun, previously of Air France.

For many years Jean Brun served on the board of directors of Air France, but presumably because of his association with Pierre Cot, the Air Minister in the Popular Front Government, he had to leave in 1938 and took over the management of the Air France office in New York. After the Armistice he appears to have made a political "about-turn," and after his return to France he took charge of the very much reduced office of the company in Paris.

Nazi Output

DR. HUPFAUER, Comptroller of Output Efficiency in the German war industry, is obviously not satisfied with the results of the total mobilisation. In a lecture given in Berlin he complained that "In most war enterprises it was impossible to observe a serious production increase despite lengthening of working hours. In fact, it has been ascertained that industrial enterprises which have lengthened their working hours and added on paper 20 per cent. of wage hours, have in reality shown hardly any increase in output."

It appears, too, that German workers are far less enthusiastic at their jobs than Goebbels' propaganda would like them to appear. "They fall ill," says Dr. Hupfauer, "absent themselves or leave before the end of the shift." To counteract this situation he recommends the reduction of working hours and concludes that working days longer than eight hours, especially for women, decrease the intensity of work."

Air France

ACCORDING to unconfirmed reports, the head offices of Air France have been moved back to Paris from Marseilles, to which they migrated some time ago after the French Armistice.

Fuel Control

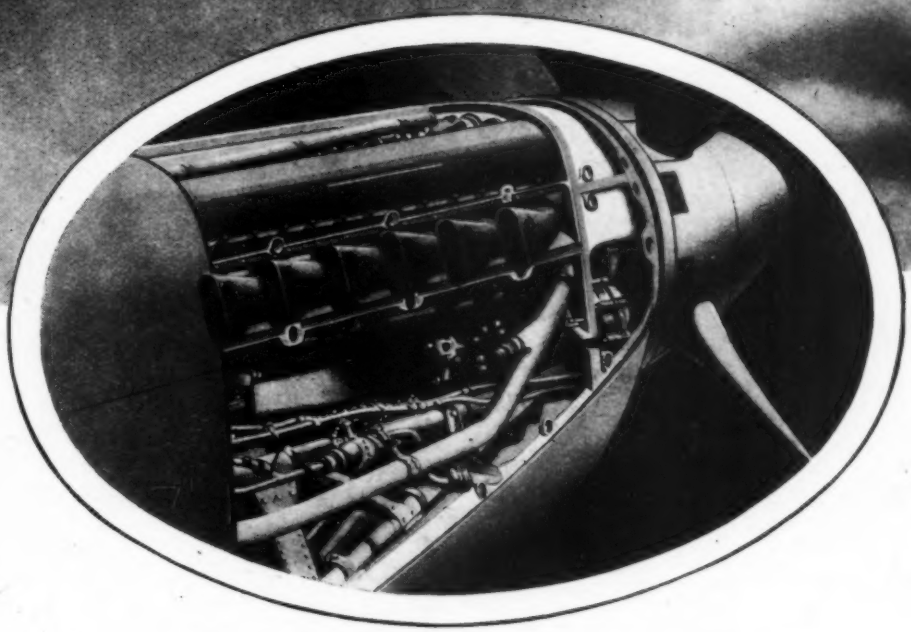
THE Italian Official Gazette publishes a Government order establishing an Economic Council for the control of research work, exploitation, and manufacture of petroleum and methane gas. The former Minister of Trade, Varga, has been appointed president of the council and is assisted by eight members.

Finale

A REPORT from Switzerland says that the Germans have seized the three French flying boats, the 65-ton Lâtécoère 631, the 42-ton Potez 161 and the 66-ton S.E. 200. It will be recalled that work on the three machines has been carried on with interruptions for some time, and only recently trial flights have been completed. Since the production of the aircraft has been financed by the Vichy Government, one could not help wondering what their ultimate destination would be. The expected answer is now given by the Germans.

As yet it cannot be said, however, whether the Germans are going to use them, or whether they have taken the flying boats into "safe custody."

ACCELERATION



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Aircraft Types and h

FAIRCHILD CORNELL

A MODIFICATION of the American Fairchild PT-23, the Cornell elementary trainer now being produced at the Fleet Aircraft, Ltd., plant at Fort Erie, Canada, is the latest type of elementary trainer to go into service with the R.C.A.F., and, as stated in *Flight* of April 22nd, these machines are being absorbed by the Dominion schools as fast as they become available.

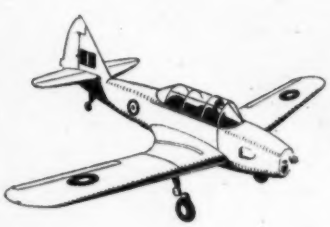
Incidentally, the Cornell is accompanied on the Fleet assembly line by the Fairchild PT-23, which differs mainly in having open cockpits and a Continental radial engine, and whose instrument panel carries only the elementary instruments necessary for primary training.

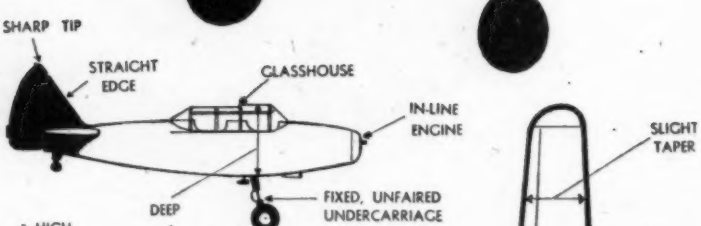
The Cornell, however, has enclosed cockpits, a 175 h.p. or 200 h.p. Ranger 6-cylinder inverted in-line air-cooled engine, and both cockpits are fitted with blind-flying instruments so that it can be used for both primary and intermediate training. Based on the design of the Fairchild PT-19 (which, it will be remembered, was a low-wing monoplane with external bracing) the Cornell called for 470 revisions to meet R.C.A.F. requirements, and the increase in horse-power from 175 to 200 h.p. is said to give an 8 m.p.h. increase in speed in spite of added weight.

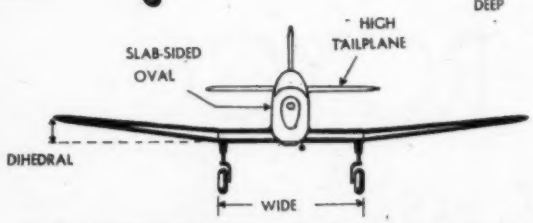
Mixed construction is employed in the airframe. Wings, tailplane and fin are of wood with plywood covering, but have tubular steel compression struts between the centre-section spars and at the roots of the outer panels, while the ailerons have a light alloy framework with ply covering and metal-trimming tabs, and the elevators and rudder have light alloy frames and leading and trailing edges with fabric covering between. The split trailing-edge flaps are all-metal. The fuselage has a welded tubular framework and is covered partly in metal and partly fabric.

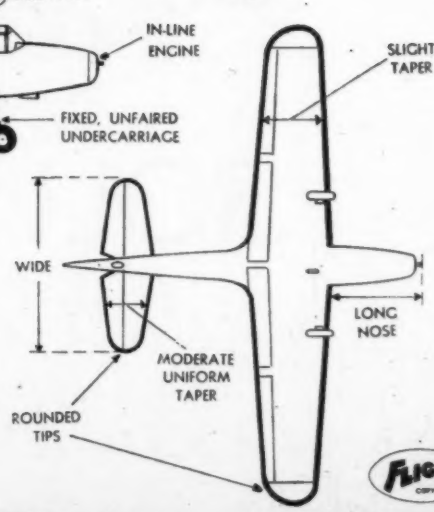
An interesting feature is that the engine mounting, which is attached at four points on the nose, is the same on both the U.S. Army Air Force PT-23 and the R.C.A.F. Cornell, and will take either the Continental radial or the Ranger in-line engine.

Although the maker's figures give a top speed of 131 m.p.h., it has been found that in actual service, with normal training equipment, the Cornell's top speed with the 175 h.p. Ranger is 115 m.p.h. and its cruising speed 90-100 m.p.h.







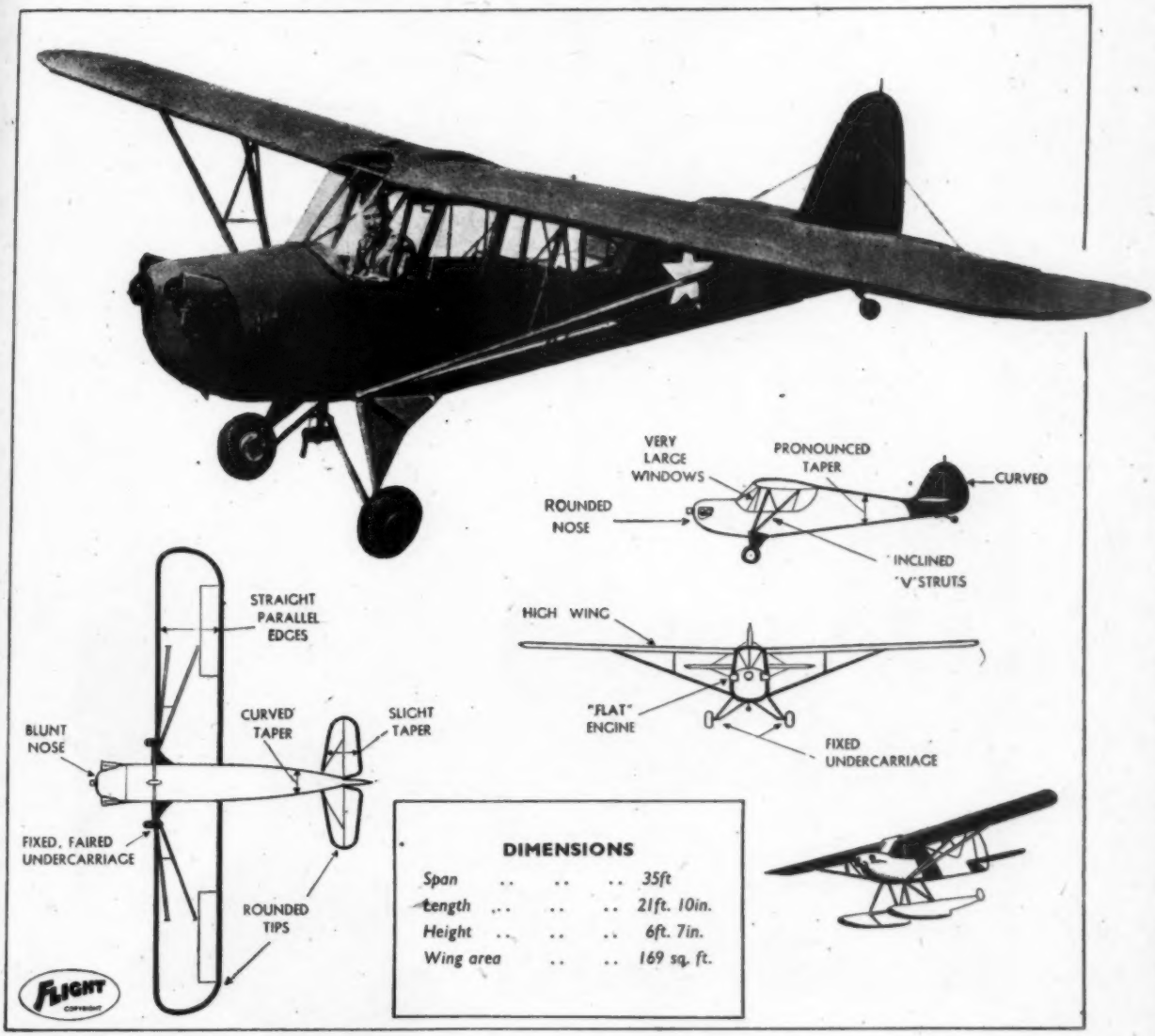


DIMENSIONS

Span	*36ft.*
Length	*27ft. 8in.*
Height	*7ft. 9in.*
Wing area (approx.)	*192.5 sq. ft.*

dheir Characteristics

AERONCA L—58B DEFENDER



DIMENSIONS

Span	35ft
Length	21ft. 10in.
Height	6ft. 7in.
Wing area	169 sq. ft.

THE Aeronca Defender, designated L-58 when it was decided to draw a distinction between these light liaison types and the larger observation aircraft whose symbol is "O," does not differ greatly from the Trainer and Super-Chief civil versions, and the L-58B is but a slightly more up-to-date edition of the 1941 model. It will have been noticed also that all three types of "Grasshopper" (as they have now been nicknamed) are so similar in general layout that it is by no means easy to recognise them from each other. All three are strut-braced, high-wing cabin aircraft with fixed undercarriages, and all have straight, parallel-edged wings with rounded tips. Incidentally the Aeronca is also now supplied to the U.S. Army Air Force as a float-plane for training purposes. This is now a necessary part of the American Army pilot's training, since he may have to fly seaplane versions of observation types, and a small sketch of the float version is included above.

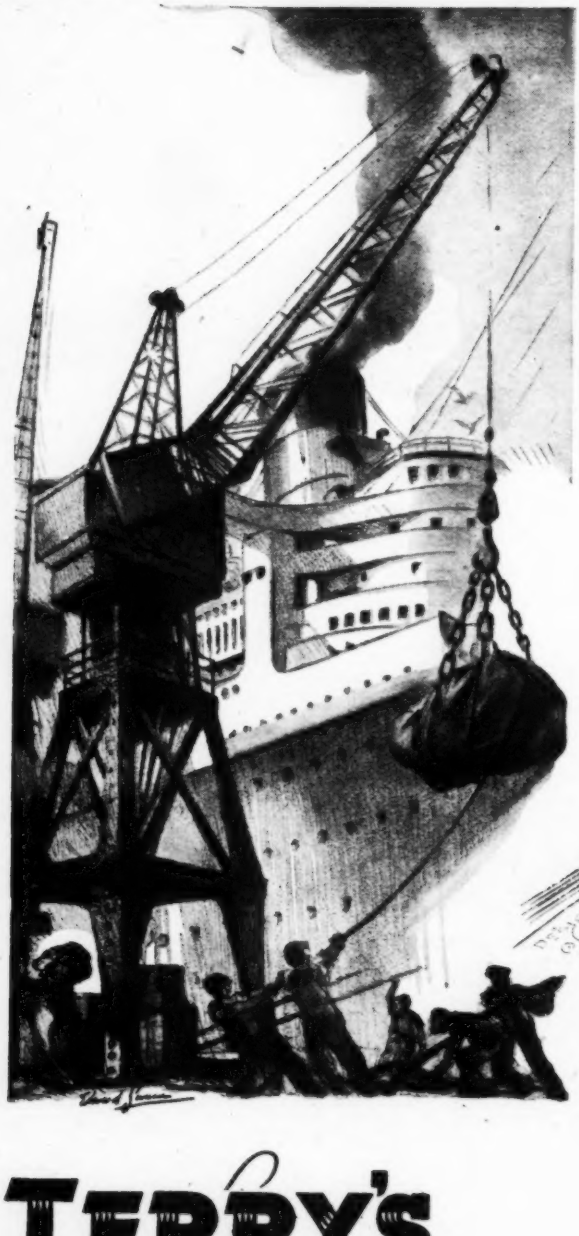
Powered by a 65 h.p. Lycoming flat-four air-cooled engine (75 h.p. at 3,100 r.p.m. for take-off) the Aeronca Defender has a top speed of 90 m.p.h. and a cruising speed of 81 m.p.h., using 55 h.p. at 2,800 r.p.m. Its service ceiling is 15,000ft., and its range at cruising speed 250 miles. Its low landing speed of 35 m.p.h. without the aid of slots or flaps makes it particularly fitted for the special duties already described.

Since good range of visibility for the occupants is an important quality, the cabin windows, it will be noticed, are very large and extend well down the sides of the deep, slab-faced fuselage. The tailplane has a moderate taper with a "bite" in the trailing edge where the elevators are cut away to give rudder clearance, and the large area wire-braced fin and rudder have a curved outline and a low aspect-ratio.

Mixed construction is employed, the wings having two spruce main spars, aluminium alloy ribs, and internal bracing by steel compression members and single-wire drag-bracing. The external "V" struts are of duralumin tube and are anchored to the bottom of the fuselage level with the leading edge of the undercarriage fairing.

Another variant of the Aeronca, derived from the civil Super-Chief model, is in service with the Civil Air Patrol as an ambulance, and accommodates a stretcher case.

PLANNING FOR POWER



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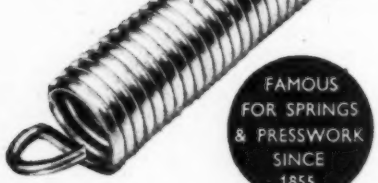

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Notes from a Test Pilot's Diary—No. 8

The Test Pilot's Status

Should He be an Inspector or a Chauffeur? : The Problem of Grading

By "WITNESS"

WHAT are the terms of reference of a test pilot? As was pointed out by certain correspondents in *Flight* a few months ago, no one seems to have laid down what his status shall be, and so it is not surprising that there is a lack of uniformity as between various aircraft factories.

First must be decided the question whether the test pilot is to be an inspector or a chauffeur—is he to be an independent critic of the work of others or to work to a cut-and-dried formula which allows him the very minimum of initiative? There is no doubt at all in my mind that if the experience and technical knowledge of the individual is reliable, the pilot should always be in the position of an inspector. He should be able to give a coherent account to the ground staff of any fault he has discovered in flight, and make a suggestion for the most likely means of a cure, in the light of his own experience. This means that, besides being able to operate the controls of the aircraft, he has also to have a sound knowledge of elementary mechanics and aerodynamics. Ideally he should be able to guide the efforts of his flight-shed staff and have sufficient confidence in himself to stand by his own decisions. He must be able to refuse to fly any particular machine if, in his judgment, it is unairworthy. This is the strongest action possible, and obviously the pilot must be very sure of his facts before resorting to such a course.

Certain Limitations

Whilst the test pilot should ideally be the final inspector, functioning on the lines mentioned above, there are certain limitations which prevent this from always being attained. These relate essentially to the human factor. No one who has just started testing, and who therefore lacks the background of experience, could be expected to advise his flight-shed staff or drawing-office concerning the most promising method of putting a fault right.

A receptive type may pick up the essentials in six months, but there are some pilots who have been testing for years and who still leave the ground technicians to sort out the snag reports and work out the most probable remedies. The weakness in such an arrangement is that the one man who should have had an insight into what was happening in flight is aloof from the many processes which go to make an aircraft operationally airworthy. Instead of taking his place at the head of the team, he is dropping out just at the time when his services are most needed to score a goal.

So when the status of test pilots is discussed, we must remember that the scale of ability, as in all professions, must vary. To lay down that everyone should be an inspector, as free and independent as the A.I.D., presupposes that every test pilot is both knowledgeable and experienced. Generally speaking, things have worked out so that we receive a status according to our deserts. Some have, through their own efforts, achieved the confidence of their employers, who are prepared to accept the pilot's recommendations without query.

At the same time, there are others who have the status of glorified chauffeurs, being allowed very little initiative, and their scope is cramped accordingly. It would be a great boon if all the latter were given the opportunity to be up-graded so that they could function in the same way as the former. And this brings us back to the very sound proposal of a school for test pilots, on the lines of C.F.S., which could instruct and grade pupils according to their several abilities. That would be the greatest possible step forward towards regularising our position.

Competing Loyalties

In quoting the similarity between the test pilot and the A.I.D. inspector, one must remember that at present there is a very important difference. The former is paid by the commercial undertaking whose aircraft he tests, whereas the latter is a Government servant. Whether such an arrangement is logical or not seems bound up with the much more complex and debatable question of nationalising the aircraft industry as a whole. It is not the purpose of this article to deal with that. But the more simple aspect of the case is one of loyalties.

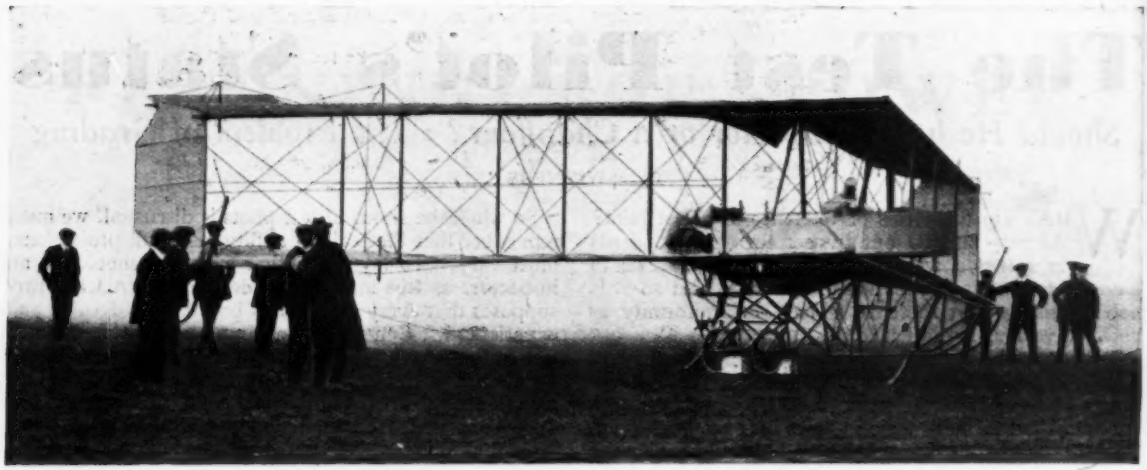
There is hardly a single senior test pilot in the country whose background is not essentially a Royal Air Force one. Some are still officers in the Reserve or Auxiliary Air Forces. Yet it is not for sentimental reasons that there is, amongst test pilots as a whole, such a general feeling of responsibility for the welfare of the Service pilots and crews. Even the commercial aspect encourages this. For if the maintenance of a high standard in the firm's aircraft pleases the Service, it follows that that firm will receive favourable consideration for the supply of new aircraft. The test pilot who keeps a high standard, although he may appear to hold up the job by insisting that it be made right, is automatically the one who serves the best interests of his employers by guaranteeing a safe and reliable aircraft to the R.A.F.

CANADA'S POST-WAR AIR POLICY

TRANS-CANADA Airlines, the publicly-owned transcontinental inter-urban air transport company, "is giving consideration to . . plans for oceanic and international flying," states the annual T.C.A. report for 1942, tabled in the Canadian House of Commons at Ottawa. A few days later Prime Minister Mackenzie King stated in Parliament that "the Government sees no good reason for changing its policy that Trans-Canada Airlines is the sole Canadian agency which may operate international air services."

"Within Canada, T.C.A. will continue to operate all transcontinental systems and such other services of a main-line character as may from time to time be designated by the Government," Mr. King stated. "Competition between air services over the same route will not be permitted whether between a publicly owned service and a privately owned service, or between two privately owned services.

"The Canadian Government strongly favours a policy of international collaboration and co-operation in air transport, and is prepared to support, in international negotiations, whatever international air transport policy can be demonstrated as being best calculated to serve not only the immediate national interests of Canada but also our overriding interests in the establishment of an international order which will prevent the outbreak of another world war."



A DUNNE BIPLANE OF 1913: The panels between the wing tips were fins only and were not used as rudders, all controlling being done by the trailing-edge flaps. The castor oil smoke from the 50 h.p. Gnome engine brings back early Hendon memories. The undercarriage was by way of being a "tricycle."

Tailless Trials

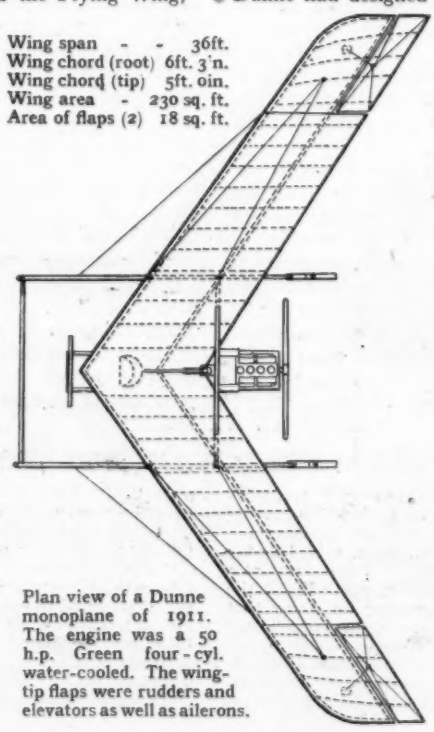
Tribute to a British Pioneer : The Dunne Biplanes and Monoplanes

By C. M. POULSEN

TO the modern generation Col. J. W. Dunne is known as the author of books such as "An Experiment with Time" and "Nothing Dies," which out-Einsteined Einstein. Only the old-timers realise that he was one of our earliest aircraft pioneers. These notes may help to show how far he was ahead of his time, aeronautically speaking.

GREAT interest has been aroused by the article published in our issue of May 13th, 1943, in which, under the title "Turbines and the Flying Wing," Mr. G. Geoffrey Smith, our Managing Editor, suggested the logical combination of the tailless type of aircraft and power plants of the turbine-compressor type. Briefly, the suggestion was that instead of trying to adapt orthodox monoplanes to the new type of power plant, the aircraft might be designed around the power plant.

Many are the attempts that have been made to produce really practical tailless flying machines. Reference has been made to several of them in our pages in the past few months. Names such as Junkers, Dunne, Hill, Lippisch, Handley Page and Northrop, recall interesting designs. In view of the revival of interest in the tailless and its large-scale version, the "all-wing" type, it has appeared to us not only fitting that a very sincere tribute should be paid to the "father" of all tailless aircraft, Col. J W. Dunne, but desirable that the results of his early work should again be made available to the aircraft community. It fell to *Flight* to record, from 1910 to 1913 or so, the trials and triumphs of Col. (then Lieut.) J. W. Dunne, but that was before many present readers took any interest in flying!

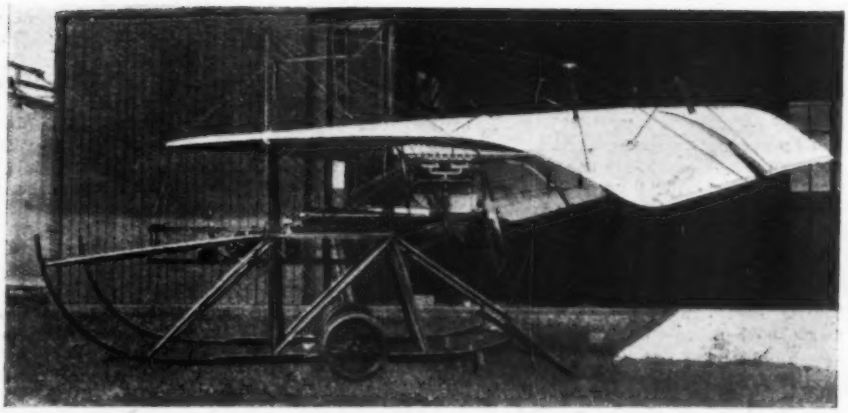


Wing span - - 36ft.
Wing chord (root) 6ft. 3in.
Wing chord (tip) 5ft. 0in.
Wing area - 230 sq. ft.
Area of flaps (2) 18 sq. ft.

Plan view of a Dunne monoplane of 1911. The engine was a 50 h.p. Green four-cyl. water-cooled. The wing-tip flaps were rudders and elevators as well as ailerons.

It is nothing short of amazing, especially in view of the relatively small progress made since, that as early as 1905 Dunne had designed his tailless monoplane wing. In the following year he showed it to Col. Capper, of the Army Balloon Section (from which later grew the R.F.C., R.N.A.S., and R.A.F.). Col. Capper, however, asked for a biplane, and a biplane version was designed and built at Blair Atholl.

To appreciate to the full the foresight and insight of J. W. Dunne it is necessary to recall that at that time aerodynamic knowledge was almost non-existent, and what little there was had not been assimilated by the majority of aircraft experimenters. Lanchester understood, from theoretical considerations, the mechanism of lift and drag, but few of those who did the practical experiments were able to follow his reasoning, in detail at any rate. "Box Kites" were the order of the day, and speeds were so low that the problem of reducing drag scarcely entered into the picture. In this connection one may, perhaps, recall as an example of the way in which experimenters were more concerned with structural strength than with aerodynamic refinement, the famous "thrush test." It was a common saying that if, in a biplane structure, there was room for a thrush to fly between the bracing wires, another



The outline of the Dunne monoplane was difficult to convey in a single picture. This side view gives a somewhat false impression, and should be studied in conjunction with the plan view on the opposite page. The large gap between down-turned wing tip and aileron was necessary because of the wing-tip curvature.

wire should be put in!

J. W. Dunne was, at that time, aiming at automatic stability, or what we used then to call inherent stability. There were two schools of thought: those who were mainly concerned with making their machines get off the ground, and those who, seeing farther than that, foresaw that if flying was ever to become a safe means of locomotion, stability was the desirable feature, as it would relieve the pilot of the necessity of being a sort of tight-rope walker. The Wright Brothers had no stability in their early biplanes, but they did have controllability. They even foresaw the need for, and incorporated in their machines, interconnection between lateral and directional control. Dunne, on the other hand, aimed at maximum stability so that, on a straight course at least, the controls could be locked and the aircraft "fly itself."

Model Experiments

Exactly how Dunne arrived at his conclusions is difficult to say. They were, one imagines, less a result of deep theoretical ponderings (although in later years he proved himself capable of remarkably clear thinking, as shown by such books as "An Experiment with Time" and "Nothing Dies") than of carefully conducted experiments with models and painstaking observation of their behaviour.

Be that as it may, even when examined in the light of modern knowledge, the Dunne biplanes and monoplanes of 1910-11 were fundamentally "right." They were not very efficient aerodynamically (the struts and wires were too numerous for that) but the wing itself had the right characteristics, although without the benefit of the modern wing sections of better L/D ratio.

Although there was no great detailed knowledge of the behaviour of an aircraft wing in those days, it *was* known that for stability the tail should be at a smaller angle than the main wing (we used to call it "longitudinal dihedral"). What Dunne did was to apply that knowledge to a flying machine without tail. He did it by sweeping back his wings at a sharp angle and by decreasing the angle of incidence from root to tip. The latter was employed later by designers generally to improve lateral stability in normal straight wings and became known as "wash-out."

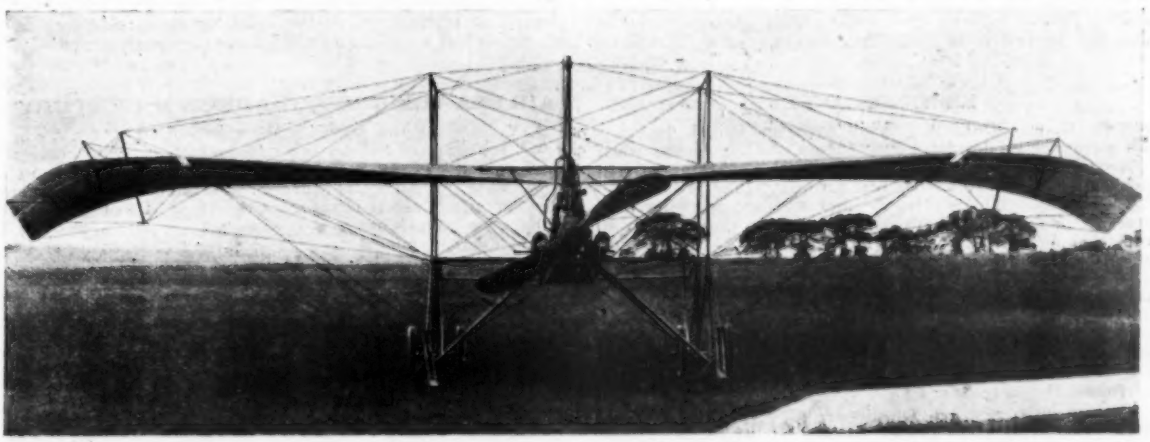
In orthodox aircraft wash-out was usually achieved by gradually raising the trailing edge towards the tip. In the Dunne designs the reverse procedure was followed: the leading edge was depressed towards the tips. It probably mattered relatively little in which way the wing twist was obtained.

Apart from his full appreciation of the effects of wash-out, Dunne also visualised that camber was important, and he designed the basic camber by imagining that the wing was cambered over a cone lying diagonally from corner to corner. In this way be obtained wing sections which varied both in incidence and camber from root to tip. At the root, the radius of curvature was short (being formed by the pointed end of the cone) and the maximum ordinate of the camber occurred far towards the leading edge. At the tip the maximum ordinate was at approximately mid-chord and the radius was long.

Low Lift Coefficients

One disadvantage of wash-out, in straight wings as in swept-back, is that the maximum lift coefficient of the whole wing is reduced, so that the landing speed for a given wing loading is likely to be increased. This is not necessarily so because other factors than C_L max. enter into the question, notably that of controllability.

In the early Dunne experiments two forms of control were employed, depending upon whether the machine was a biplane or a monoplane. Ideally Dunne considered the monoplane to be the better of the two types, but low wing loading was more readily achieved with a biplane and, as already mentioned, Col. Capper asked for a biplane, and



This rear view of the Dunne monoplane fails to convey the vee form of the wings but does show the shape of the down-turned wing tips. The thin tall object in the centre is not a wireless mast but the radiator, which flew "edge-on."

so a biplane was built. In some ways it offered an "easier" solution than the monoplane.

There were detail differences between the various types of Dunne biplanes, but the fundamental feature of back-swept, twisted wings was common to them all, as was also the use of ailerons near the wing tips. Between upper and lower wing tips were fixed vertical panels. They corresponded to the fins of the orthodox aircraft and were designed to provide directional, or as we used to call it "weathercock," stability. The trailing-edge flaps on upper and lower planes served both as ailerons and elevators.

On each side of the pilot was a lever, that on his right operating the starboard, that on his left the port flaps. The levers moved in a fore-and-aft direction. In discussing the control effect of the flaps it is necessary to bear in mind that, owing to the pronounced wash-out, the wing tips were always flying at a negative angle of incidence; otherwise there would have been no fore-and-aft stability.

Operation of the controls was as follows: for making a right-hand turn the pilot pulled back the right-hand lever. This had the effect of raising the trailing edge of the starboard flaps, or in other words increasing their negative angle of incidence and depressing the starboard wings.

It might have been thought that this in itself would be sufficient for making a turn, and so it would had it not been for the fact that, the flaps being so far behind the centre of gravity, the depressing effect would tend to make the machine climb. An elevator effect, in fact. Dunne overcame that difficulty by moving the left-hand lever forward. This depressed the port flaps, otherwise decreased their negative incidence, so that the lift increased and the elevator effect was opposite to that of the starboard flaps, the net result being no elevator effect. At the same time, drag was decreased on the port side and increased on the starboard. That at least was the theory. It will be obvious that by suitably "juggling" with the two control levers the pilot could get almost any combined rudder-aileron-elevator effect desired. The modern pilot, however, would not be likely to take kindly to such a system of control levers, although in the Dunne machines provision was made for locking the levers in any desired position.

Stability Demonstrated

That Dunne did achieve a very large amount of automatic stability was demonstrated in two flights which he made over the flying field at Eastchurch, Isle of Sheppey, on December 20th, 1910. The flights were observed, on behalf of the Royal Aero Club, by Mr. Orville Wright (who was at that time on a visit to this country) and Mr. Griffith Brewer. On the second of the two flights a typewritten statement by Mr. Griffith Brewer was handed to Lt. Dunne, who was asked to make notes on it during the flight. The statement was on very thin paper, so that it would have been quite impossible for Dunne to write notes on it without using both hands.

The Dunne biplane was undoubtedly stable, and the designer proved it in these two flights, during which he locked the control levers except for the moments when they had to be reset for changing from straight flights to turns, and vice versa. Normally the machine could be flown entirely "on the throttle." That is to say, once the correct setting for the levers had been found, opening of the throttle made it climb, closing of the throttle made it descend. It was even possible to land it merely by manipulating the throttle, although on the occasion of the demonstration flights this was not thought advisable because the machine had to touch down on a fairly steep upward slope.

Before leaving the subject of Lt. Dunne's demonstration flights, it is interesting to recall a fact which again shows how far-sighted was this pioneer designer. In the course of an account of these two flights which we published in *Flight* of February 18th, 1911, by Lt. Dunne himself, he wrote as follows: "Obviously, the first thing to do was . . . above all to show that with this type of machine good turns, with the correct amount of banking and no side-slipping, could be effected without recourse to the complicated 'three-rudder' system." In other words, as early as 1910 Lt. Dunne realised the "unnaturalness" of the type of control which has since become standard the world over, and which demands so much skill of the pilot. It was nearly twenty years later that we began again to look into the question of "two-control" aircraft manipulation!

Down-turned Wing-tips

Reference was made earlier in these notes to the fact that the Dunne biplane was in some ways "easier" to get right than the monoplane. In 1911 Lt. Dunne designed a monoplane which had a feature recently incorporated by Jack Northrop in his "flying wing." The wing tips were down-turned and carried the controlling surfaces. In the biplane it had been a very simple matter to fix vertical surfaces between the wing tips and so obtain the necessary fin area aft of the c.g. In his monoplane Dunne endeavoured to achieve the same object by turning down the wing tips, and a fair measure of success attended his efforts, although the monoplanes never had quite the same degree of "automaticity" as the biplanes. There is no doubt that it could and would ultimately have been achieved, but in the meantime the more orthodox types of aircraft forged ahead, and presumably those who had been financing Dunne lost faith and allowed others, who took the line of least resistance, to reap an easier harvest. But for that fact the history of flying might have developed differently and we might have had flying machines which did not require months of training before their pilots could be passed out.

This tribute to a British pioneer may be suitably concluded by recalling the fact that, in addition to automatic stability and two-control flying, the Dunne biplanes of 1910 had tricycle undercarriages. There does not seem to be very much that John William Dunne did not foresee. It was something of a tragedy that he should have elected to retire from active aviation work, although he has never lost interest and still follows developments closely.

SECONDS OUT!

STAR boxers of the A.T.C. all over the British Isles are getting ready for the biggest fights of their careers when "North" meets "South" in the National Air Training Corps finals at the Royal Albert Hall on Saturday, June 12th.

The championships started by inter-squadron and inter-wing contests to decide county champions. Then counties met to decide command champions. After that all Southern Commands and Northern Commands contested to find Southern ("Silver Wings") champions to meet Northern for the national finals.

London Command finalists met Central Command at Hornsey on May 17th. On Saturday last, London and Central combined to meet South-East Command at the 'Drome, Brighton, and the Welsh finalists met representatives from the South-West at Bristol the same day.

Sixteen cups and trophies, including the Lord Harewood trophy, have been presented to the A.T.C. Boxing Association for the winners in eight weights in the junior and senior sections. Among them is a two-handled silver cup for the Midget-weight (Junior Section) presented by *Flight*.

AIR/SEA RESCUE SQUADRON'S CENTURY

"BY searching, we save" is the motto of an air-sea rescue squadron in Fighter Command which is approaching a total of 100 lives saved in the Channel. Since January 1st, 1942, when this particular squadron was formed, it has brought back more than ninety airmen, mostly Allied personnel, though a few have been Germans.

Bad weather, minefields—there has been more than one instance of a Walrus amphibian pilot "hopping" his loaded aircraft over an enemy mine in the path of the take-off—and long hours of taxying back to port are faced with the same courage, determination, and skill as are shown by their brother fighter pilots.

Sqn. Ldr. A. S. Linney, native of York, twenty-nine-year-old commander of this squadron, has never had to be told of the value of the Air-Sea Rescue Service. He was shot down at Dunkirk, but, luckily, was rescued by two Frenchmen in a rowing boat.

Air-gunners fly with the pilots—"just in case"—but more often than not they return with all their ammunition. They lend a hand in pulling the rescued men into the Walruses.

H.M.S. *Battler*

Escort Carriers for Atlantic Convoys

THE conversion of merchant hulls into aircraft carriers for escort duties with Atlantic shipping provides the latest weapon against the U-boat. Here is H.M.S. *Battler*, first of the new type, which carries Seafires and Swordfish and has a complement of 70 officers and 450 men under Capt. F. M. R. Stevenson, R.N.

H.M.S. *Battler* is largely pre-fabricated and is an all-welded job.

(Top, right): This port beam view of H.M.S. *Battler* shows her slim "island" superstructure. (Bottom, right): A torpedo-equipped Swordfish coming up in the lift. (Above): The deck control officer, complete with illuminated signalling "bats."

Sir Nigel Norman

Passing of the Founder of Heston Airport

ON May 21st it was officially announced that Air Comdre. Sir Nigel Norman, Bt., A.A.F., had lost his life this month while flying on active service.

Henry Nigel St. Valery Norman was born on May 21st, 1897, son of the Right Hon. Sir Henry Norman (created a baronet of Honeyhanger, Surrey, 1915), whom he succeeded in 1939. He was educated at Winchester, and at Trinity College, Cambridge, and during the 1914-18 war served in France in the R.G.A. and the R.E. In 1926 he became a private aircraft owner, and two years later, with Mr. F. A. I. Muntz, founded Airwork Limited to construct and develop Heston Airport. He specialised in planning airports in this country and abroad.

In 1926 he joined the Auxiliary Air Force as a pilot officer, and served with No. 601 (County of London) Squadron for 10 years, being promoted squadron leader in November, 1931. In March, 1940, he became temporary wing commander; in June, 1942, temporary group captain, and in March this year acting air commodore.

From the early days of the war he worked in close collaboration with the Army on matters pertaining to airborne troops. It was his brain which controlled the air side of the first British paratroop raid on Italy shortly after she entered the war. He not only arranged all the details, but took a personal interest in all the numerous training exercises before the raid and accompanied the paratroops on the expedition, returning, regretfully, he said, in an aircraft, as he was not at that time a proficient parachutist.

When he got back he went on a parachute course at one of the R.A.F. schools. He distinguished himself in the raid by British parachute troops on the coast of northern France in March, 1942, when the radio location post at Bruneval, 12 miles north of Havre, was destroyed. It was a combined operation of the Royal Navy, the Army, and the Royal Air Force, the carrying force of R.A.F. bombers being under Grp. Capt. Sir Nigel Norman and led by Wing Cdr. P. C. Pickard. As officer commanding a R.A.F. formation of an airborne division he was responsible for the intricate organisation before the transport of our airborne troops to North Africa. In 1926 Norman married Patricia Moyra, eldest daughter of the late Lt. Col. J. H. A. Annesley, and they had three sons, the eldest of whom, Mark Annesley, born on February 8th, 1927, succeeds as third baronet.

Private flying, commercial and Service aviation all lose a man of a type they can ill spare in the death of Nigel Norman.

For the four years he commanded 601 squadron, those who were associated with him knew that a better or more enthusiastic commanding officer could hardly have been found.

His interest in aviation was unbounded, and there were few aspects of it that he omitted from his activities. In 1935, in association with Graham Dawbarn, he founded the firm of Norman and Dawbarn, and was responsible for the lay-out of many municipal airports in this country, including those at Birmingham, Ringway, Jersey, and Guernsey.

He was a Fellow of the Royal Aeronautical Society, a member of the Aviation Committee of the London Chamber of Commerce, and a member of the Council of the Air Registration Board, of which body he was also chairman of the Design and Construction Panel.

It is not only for his aviation activities that Nigel Norman will be remembered. He combined an imaginative approach to the problems of civil aviation which, together with his great personal charm and translucent integrity of character, made it certain that he would have played a great part in the future of civil aviation.

Air Transport

A Statement by the Joint Air Transport Committee

THE Joint Air Transport Committee of the Association of British Chambers of Commerce, the Federation of British Industries and the London Chamber of Commerce has since the commencement of this year been examining the current and prospective position of British Air Transport, and has received the fullest information both from the appropriate national organisations and from a number of gentlemen qualified to speak on these questions. It regrets to report that it is most profoundly exercised by the situation which is revealed. Various discussions have taken place between Ministers and representatives of the Committee, but in spite of the appreciation of the importance of this matter by individual Ministers, the Committee regrets that it finds in Government policy no adequate appreciation of the unhappy results which may flow from a continuation of the present situation, where British air transport represents a very small percentage of that of the United States of America.

Ourselves to Blame

It is obvious that, immediately after the war, there will be a great demand for air transport services throughout the world. If the British Empire has not the aircraft and the crews with experience to undertake these services, it is clear that they will need to be operated principally by the United States of America. If this in fact occurs, it will be quite unfair to suggest that the United States has taken more than its fair share of international air transport, for our unenviable position will be primarily due to the failure of the British Empire to look squarely at this issue in 1942 and 1943. It will be conceded by all the United Nations that the British Empire has played an outstanding part in the war in the air. It would be no contribution to international good fellowship and understanding if, after the war, the British peoples found that, through the lack of a clear and timely policy, their supreme efforts in the war in the air were being mocked by crippled opportunity in the air transport services of the world.

The Joint Air Transport Committee appeals to Parliament, and through it to the nation, to prevent this calamitous situation arising. The Committee considers it imperative that a British Empire Policy for air transport both for the remainder of the war and for the peace be agreed as a first step and at once. With Imperial agreement, negotiations should immediately take place with the United States of America with a view to reaching agreement upon the international air services of the British Empire and the United States of America. These would exclude both the internal services within and between countries under the British and American flags respectively, for there exists a clear right for all the territories under one flag to link themselves together by air without let or hindrance by other Powers. The aim of these negotiations should be to establish the principle that the international air services of the United States and the British Empire should be based on parity in terms of a mutually acceptable yardstick. When this preliminary agreement has been reached, discussions should take place with Russia and China and then the remainder of the United Nations to decide what quantitative relation this parity should bear to the air transport services of other countries. It must, however, be emphasised that, although an agreed international structure is most desirable, our future will depend, as always, on our own enterprise and resolution.

On the operational side, air transport is clearly becoming increasingly important to the war effort, and the Joint Committee accordingly congratulates the Government on its decision to establish the Air Transport Command for this purpose. The Commitee trusts that this Command will be generously furnished with transport types of aircraft. In the first instance, these may need to be American, but it is important that new and modern types of British transport aircraft should be put in hand forthwith, and it is suggested that this can now be done without detriment to our air offensive. The Committee also emphasises the importance of developing the British Overseas Airways Corporation, so that with an increased degree of autonomy its prestige may be restored and it may play a distinguished part in the air transport services of the Empire.

No Monopoly

In regard to the post-war position, the Joint Committee is further considering the problems involved, but already it is satisfied beyond all doubt that for a vigorous and progressive air transport system it will be necessary to rely not on one only but on a number of separate organisations under the British flag, in which private enterprise must play its proper part. It is inconceivable that the outstanding successes of our mercantile marine could have been achieved through the medium of one State-owned, State-controlled steamship organisation. There is no justification for thinking that sea transport and air transport differ in this matter of fundamental organisation.

The association of the Air Ministry with civil air transport has been neither happy nor successful, and it is vital that as soon as practicable after the war the responsibilities of Government as regards air transport should be in the hands of a non-military Ministry.

Strong, efficient air transport services are essential to permit the British Empire to play its full and proper role both in the military effort of the war and in the stable organisation of the peace. Action is imperative now.

REPORT OF LAMPLUGH COMMITTEE

FORMED in September, 1942, under the chairmanship of Capt. A. G. Lamplugh, the independent committee had for its object to examine the problems and possibilities of civil aviation in general and air transport in particular. The committee has just issued its first report, after hearing evidence from leaders of various branches of the aircraft world.

The need for British aircraft firms to concentrate at present on the production of military aircraft is acknowledged, but the committee urge that no time should be lost in diverting a small part of our energies to civil design so that the Empire routes may be maintained.

The main recommendations for the development of civil aviation are:—

An early understanding between the British Empire and the United States, or alternatively, an Empire declaration of air policy to give a lead to the world.

Fullest co-operation with the Dominions with a view to their acquiring rights and obligations over the routes in which they are specially interested.

Removal of air transport from the control of the Air Ministry. If this is not practicable at present, because of the war and the constitution of the R.A.F. Air Transport Command, it should be effected as soon as possible after the war.

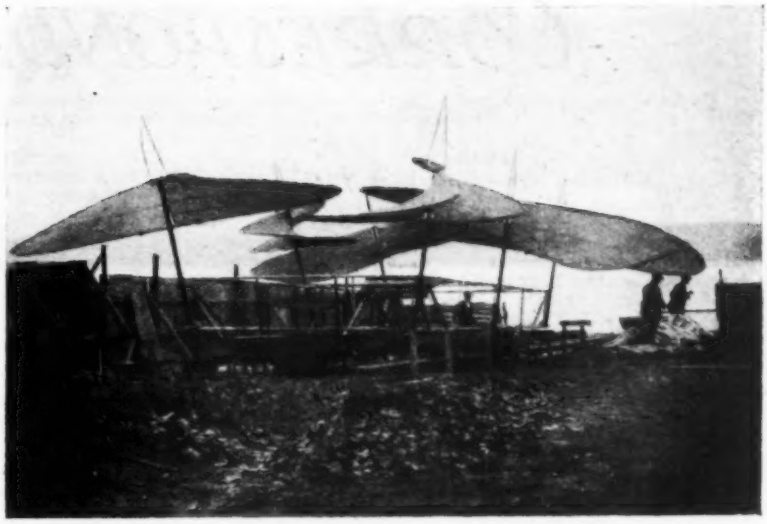
Meanwhile effective control should be exercised by a Civil Air Council, co-equal with the Military Air Council.

Ultimately air transport should be developed by private enterprise along lines similar to the Mercantile Marine. It should be subject only to sufficient Government control to ensure efficiency, safety and the maintenance of international relations.

A Ministry of Civil Aviation should be set up after the war, with a Minister of Cabinet rank.

The Mumford Helicopter

Six Lifting Screws on a Very Spidery Framework : 40 Pounds per Horse-power : Some 1906-1914 Experiments



With an N.E.C. four-cyl. two-stroke engine of 40 h.p. the Mumford helicopter lifted 1,600 lb. This picture shows it on floats, in 1914.

OUR recent articles on rotating-wing aircraft have reminded an old reader and friend, Mr. J. Pollock Brown, of some experiments in which he took part during the period 1906-1914. Mr. Pollock Brown, it may be necessary to remind our readers, was the moving spirit in the firm P.B. Deviators and the inventor-designer of those ingenious turn indicators and mechanical pilots. He was at one time a technician at the Royal Aircraft Establishment, but during the period here under review he was associated with Denny Brothers, of Dumbarton, who were developing a direct-lift aircraft to the ideas of the late Mr. E. R. Mumford.

In 1906 little was known about the thrust (or lift) obtainable from airscrews, although as chief of the Froude tank at the National Physical Laboratory at Teddington Mr. Mumford knew pretty well all there was to know about marine propellers. Another great drawback was that there was no petrol engine available light enough to leave sufficient over for lifting the framework, screws and pilot.

Too Much Supercharge

"Our first engine," Mr. Pollock Brown says, "was an 8-cylinder 'Farcot,' which had practically to be rebuilt before it even approached the guaranteed power. Then, in about 1908, I incorporated a supercharger in the engine and got so much extra power that the dynamometer was wrecked and the engine damaged!"

The next engine was a British N.E.C., a four-cylinder two-stroke, water-cooled, which was used a good deal by early British experimenters. Interesting sidelights on early aviation engines are thrown by Mr. Pollock Brown, who says: "We never made any attempt to fit an engine to the craft before it had been independently proved. The N.E.C. was tested on our own dynamometer at their works, and certainly 'toed the line' after some coaxing."

The N.E.C. engine had a bore of 3.7in. and a stroke of 4.5in. It was rated at 50 h.p., although it is doubtful if it ever developed more than 40. The weight was 150 lb., which was remarkably light for those days. Scavenging was by a Roots blower, one part of which expelled the exhaust gases and the other delivered a fresh explosive charge.

Denny Brothers were, of course, first and foremost interested in shipping matters, and the helicopter experiments had to be made in spare time, often enough against scepticism, one may suppose. Consequently, it is scarcely surprising that they spread over many years without spectacular achievements. Moreover, knowledge of aerodynamics and of light structures was scarce, and pretty well everything had to be schemed out, designed and tested before it could be incorporated.

Work on the lifting screws proceeded step by step, through computation and trial, beginning with single screws. Ultimately no fewer than six were used! They were mounted on a very flimsy spider framework since every possible ounce of weight had to be saved on account of the heavy engines which were the only ones then available.

Fabric Lifting Screws

The screws themselves were flimsy affairs: fabric stretched over Canadian elm rims, with a few bracing members inside. The main lifting screws had a diameter of about 24ft. and a pitch of 35ft. It was calculated that they would have to run at 45 r.p.m. in order to give a lift of 1,600 lb., which was the weight of the apparatus with Mr. Pollock Brown on board. The whole contraption was fragile in the extreme, but, Mr. Pollock Brown says: "It was remarkable how little squirming took place with all these propellers working together and overlapping. This was due to the generous wire bracing, though the factor of safety was reduced to about 4 in an endeavour to cut down the weight, which had a knack of increasing with the development of the power installation. The lift was definitely checked and the power recorded on a torsion dynamometer, first from an electric motor on the ground, transmitting through a vertical sliding shaft, and later confirmed on another dynamometer at the engine clutch."

From the known engine power and the loaded weight of the machine it was definitely proved, although free flight was not attempted, that direct lift was possible. The lift corresponded to 40 lb./h.p., which must be considered a very fine effort with such crude apparatus. The machine was mounted on both skis and floats, but the spectacular results achieved by Wilbur and Orville Wright and others caused the experiments to cease, and thus it was never possible to develop the machine to the point where it could make use of them by making actual free flights.

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

FEAR

Safeguard Against Accepting Risks

IT was refreshing to read the article on fear in May 13th *Flight* by a test pilot, who writes under the name "Witness," in which he says that he has never seen the subject of fear as felt by the test pilot committed to paper, and in which he acknowledges that he himself has experienced this universal sensation, which it is fashionable to deny.

"Witness" will no doubt be interested to read the "Analysis of Fear" which was published by the Air League in the November, 1936, number of *Air Review*. In that review the writer states that fear is a natural emotion, which is our safeguard against accepting risks. If we cannot recognise risk, there is no virtue in risking. The more one is nervous the greater is the virtue in overcoming one's nervousness. He says that it was some time before he could step into the cabin of a passenger aircraft with equal confidence to when stepping into a bus, but he now enjoys an Airways flight. "The ease and comfort of being well looked after, the freedom from dust, freedom from bumps of surface travel and the exhilaration of breathing the sparkling mountain air, ensure a restful journey."

The writer attributes his good fortune in being able to secure a seat on a passenger aircraft at a price little in excess of the seat he would otherwise occupy on train or boat to the fact that the great majority of people who travel have not the confidence required to let them go by air. The accidents so widely advertised maintain the popular fear, a fear which is most damaging to popularity of flying in. that it is not acknowledged. Now, however, with the immense increase in flying brought about by the war, he anticipates that flying will become so universal that he will have to pay several times as much to go by air as he would otherwise pay by going on surface transport.

I congratulate "Witness" on his fearless discussion of fear, and hope that it may be the means of making us more candid as to our real feelings on the subject in the future.

GRIFFITH BREWER.

TECHNICAL TRAINING

Modern Wars are Won by Engineers

MR. GEOFFREY SMITH'S note in *Flight* of May 13th stressing the need for a University of Aeronautics raises the vital question of the importance to be attached to the training of engineers and technical men and their relation to modern war as compared with service men.

If we look at the reports of any battle, whether it be at sea, on land, or in the air, the first thing we notice is the significance attached to the casualties in fighting equipment, the tanks or the aircraft destroyed, or the ships sunk. The fact that so many hundred or thousand fighting men were also destroyed is seldom if ever mentioned. It is as if they were of only secondary importance to the tools they fight with.

Then, again, take the actual battles themselves. In Singapore, Crete, Norway, and elsewhere, the cry has always been the same—the better fighters than the enemy calling out for better tools than he has and more of them. In the Battle of Britain, where we had the better tools, even though we did not have the quantity, we beat our enemy because the Hurricane and Spitfire were superior to his designs. The human element in the mass scale of modern war hardly counts. Given a squadron of North of England pilots in the latest Spitfires fighting a squadron of South of England pilots of greater experience in Bristol Bulldogs, the result would be a foregone conclusion in favour of the Spitfires. The skill and bravery of the personnel would not enter into it, for the result would have been decided beforehand in the drawing offices and factories where the better machine was evolved.

Look now at the broader aspect of this whole war. We see it consists of little more than the engineering industry of Japan and Germany—with those of her subject countries—fighting the engineering industry of Russia, Great Britain, and America. In fact, one might say that a good way of deciding who is going to win the war is to say the side with the greatest number of engineering man-hours and machine-tool hours at its disposal and the side with the more advanced engineering development—not the side with the bigger armies.

This brings us to the question: who is the more important, the man who makes the tools to fight with, or the man who uses the tools? In the past both have been equally important, and to a large extent they are to-day, but in the future it will be the engineer. We already have the torpedo, which is of such perfect design that once it has left the tube it goes and does its fighting without the use of the human element, and the time is perhaps not so far distant when we shall have bombers sent over enemy territory by wireless and possibly being intercepted by wireless-controlled fighters. That is the tendency in modern war, any way, and it is a fact that should not be ignored.

Examine the problem from yet another angle, that of training the personnel to make his tools and to man them. Consider, for instance, the length of time it takes to train a draughtsman, planning engineer, tool maker, or machine operator, and the comparatively insignificant time it takes to teach someone to drive the car that they make The more developed engineering construction becomes, the more simple will it be to use the tools it has made. In fact, the hall-mark of good engineering is simplicity in the operation of the finished product—to build cars, tanks, and aircraft that anyone can use with the minimum of training.

Since, therefore, the engineering industry is becoming the first line of defence, and the fighting forces are becoming only secondary in importance to it, what are we in this country doing to modernise our outlook to meet the requirements of modern war? What inducements, such as rank and honours and pensions, are there to encourage youths to be like Mitchell and Sidney Camm, the designers of the Spitfire and the Hurricane, of whom they have probably never heard, even though their achievements are equal to those of a successful general? And what public institutions like Sandhurst or Woolwich or Cranwell are there to train officers and designers for the engineering industry?

It seems that in our schools and universities we are backing the wrong horse in giving so much prominence to training youth predominantly for the fighting forces, for, once we let our engineering indusry lag behind that of our enemies, no amount of brave, trained men can save us if they have not better tools to fight with.

R. D. LEAKEY.

INTERNATIONAL AIR POLICE

"No Chance Whatever of Success"

YOUR correspondent "Group Captain," in his letter published on May 6th, 1943, seems unaware of the dangers of an international air police force.

Maj. C. H. Douglas writes in his recent work, "The Big Idea," "that fundamentally collectivism has no chance whatever of success, but it has a real chance of setting back the clock of human happiness by hundreds of years."

Has "Group Captain" ascertained if any M.P. asked Mr. Churchill whence he obtained his mandate to make the reference to "a really effective league" in his broadcast on March 21st, 1943? He points out it is noticeable that Sir Stafford Cripps and Mr. Henry Wallace, of America, have been leading public opinion explicitly in support of the spell which entrances them.

An international tribunal with an international air police force might tyrannically enforce, not help, as diplomatically put by "Group Captain," the Nazism that made Germany a police State. It implies handing over the British Army and Navy also, so that rebellion against its dictates can be appropriately (?) dealt with.

Robert Peel's civil police force was concerned with the affairs of individuals on the spot, which is the essence of the British idea of freedom, as opposed to the idea of centralised control and absentee management which is inherent in such philosophies as a world authority. Any limitation on freedom should be determined by democracy, not imposed on the individual by an external authority, otherwise the "inalienable right to life, liberty, and happiness" has no meaning.

Fortunately, the barriers against air transport are not so much national as dependent upon correction of a faulty financial system which can be effectively dealt with by the aroused will and conscience of individuals in association.

New A.T.C. Syllabus

Post-proficiency Training to Replace the Part II Course : Fitting Cadets for Leadership : Gliding for Proficient Aircrew Volunteers

WITH the main object of fitting cadets for leadership by increasing confidence and encouraging self-expression, a new post-proficiency course has now been introduced into the A.T.C. training syllabus to take the place of the former Part II proficiency course. An important feature is that it provides the proficient cadet with the chance to help in the instruction of his less advanced colleague.

This change, which synchronises with the start of the Corps' third year of activity, will not only be more advantageous to the cadets themselves, but because the new post-proficiency training programme is a flexible one, it will be more convenient to the units; it leaves them a wide discretion in applying it, so that they can adapt it to their own instructional capacity and individual circumstances.

Less Classroom Work

Until now the advanced Part II training has been in the subjects covered by the normal syllabus plus other subjects which are taken up after entry into the R.A.F., and it was felt that the scheme had led to some over-emphasis on classroom work with the Part II examination in view.

Now, however, the new scheme makes the cadet's advanced training more objective and, by getting away, to some extent, from the classroom, will also make it more interesting; he will feel he is so much nearer to the real job. The post-proficiency course does not involve any examination and carries no certificate of its own, but the results of it are noted on the cadet's Certificate of Service, and those with a satisfactory standard will receive priority of call-up and will also be allowed to take their I.T.W. final examination at an earlier stage, and so save several weeks of that course. Those who have already passed their Part II examination will be able to miss I.T.W. and go straight on to the special short course, the same as University cadets.

An interesting phase of the new post-proficiency training is that devoted to Air/Sea Rescue. This embraces life-saving, dinghy drill and parachute harness drill; considerable importance is paid to swimming, and suitable cadets will visit Air/Sea Rescue stations where they will have opportunities to go out in the launches, but not operationally.

Another branch of A.T.C. training—and one which is particularly popular—is practical instruction in gliding and glider construction. As mentioned on the "Here and There" page of *Flight* of May 13th, more than 2,000 cadets have already received practical flying training in gliders without so much as a single casualty during the course of some 10,000 launchings. Of these, 1,600 were high hops and more than 8,000 low hops. In addition, nearly 1,300 cadets have had dual instruction in two-seater gliders, and in the elementary stage 21,910 have been given ground slides.

It should be understood that gliding instruction is not, at the moment, included in the normal training syllabus of the A.T.C., although its value is fully recognised; this is simply because there are not yet adequate facilities to make it universally available. It is consequently limited, at present, to cadets who are aircrew volunteers and have gained their proficiency certificates. Further expansion depends to a great extent upon available labour for building gliders and the training of more instructors.

Already, however, the A.T.C. Cadet's Gliding and Flying Log has been printed and issued so that embryo pilots and aircrew may keep a proper record of their preliminary flights.

From the original formation of one school for the training of instructors, the total number of schools for both cadets and instructors has risen to 56 actually in operation. More sites have now been approved, and some of these will be working this summer. About 150 instructors have already qualified and have started training cadets, and a further 200 potential instructors are at present receiving the necessary training.

Winch Launching

All launching is done by winch, since this method has been found to be the safest, and cadets awaiting call-up for ground duties in the R.A.F. and Fleet Air Arm can have valuable experience in the maintenance of gliders, winches and retrieving cars, and in the actual construction of gliders which is now being undertaken by the squadrons themselves.

Drawings and jig drawings for a standard type of glider for the A.T.C. are issued and materials supplied, and the work not only augments the supply of gliders from other sources, but provides valuable technical experience for both aircrews and maintenance crews. Incidentally, gliders built by individual squadrons are not retained for the exclusive use of the builders, but go to the nearest glider school to which the squadron is affiliated.

Primary and secondary types of glider are in use with the A.T.C., but a few higher performance types in the sailplane category have also been acquired, their characteristics being modified to bring them into line with A.T.C. requirements. Civil gliding clubs have generously provided about 100 gliders for the A.T.C. since this training was first introduced last year.

CORRESPONDENCE—Continued

It is hoped Great Britain will be aware that genuine peace depends upon diffusion, not concentration, of power and maintain her democratic intuition and not relinquish her leadership by which she largely won the Great before her liberty-loving name.

GYPSY.

THE C.W.21B

Details of an Earlier Type

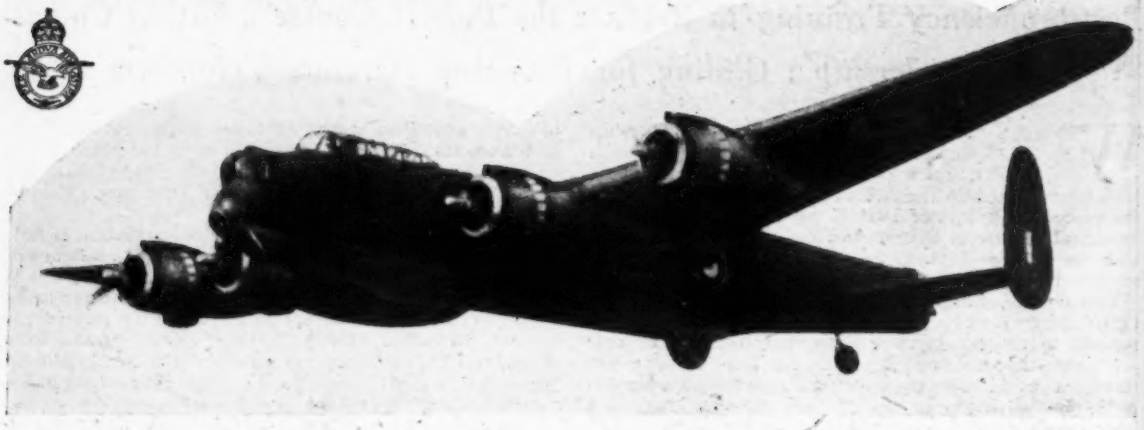
I WOULD like to supply some details of the C.W.21 for R. E. Gregory, who asked for some in your issue of April 29th.

One 1,000 h.p. Wright R 1820-G5 engine.
Climb to 5,280ft. in 1.0 mins. Crew 1.
Maximum speed over 300 m.p.h. at 17,000ft.
Maximum speed at sea level 260 m.p.h.
Cruising speed at 17,000ft. 270 m.p.h.
Stalling speed 68 m.p.h.
Absolute ceiling 36,500ft.
Service ceiling 35,500ft.
Range (on 600 h.p.) 502 miles.
Range (on 500 h.p.), 630 miles.
Tare weight 3,050 lb
Gross weight 4,092 lb.
Armed with one 0.300 machine gun and one 0.500 machine gun.

The C.W.21 is a low-wing, all-metal machine and the objectives aimed at were high speed and high rate of climb. Therefore, the range had to some extent to suffer.

A. T. HENSHAW (536 Flight, A.T.C.)

SERVICE AVIATION



Avro Lancaster II with Bristol Hercules engines. The pronounced swelling in the region of the bomb bay is capable of accommodating "block busters."

Royal Air Force and Fleet Air Arm News and Announcements

Awards

Fleet Air Arm

THE KING has been graciously pleased to approve the following awards:—

For great courage, initiative and excellent airmanship in rescuing a fighter pilot based on Malta, who had been shot down in the Mediterranean. Though attacked by six Messerschmitts he brought his aircraft safely back to Malta:

Distinguished Service Cross

Temp. Lt. (A) R. D. PURSALL, R.N.V.R.

FOR outstanding bravery in operations from Malta against enemy shipping in the Mediterranean:

Distinguished Service Cross

Temp. Sub. Lt. (A) T. BARR, R.N.V.R.

FOR bravery and initiative.

Mention in Despatches

Lt. (A.) C. C. THORNTON, R.N.V.R.

Royal Air Force

THE KING has been graciously pleased to approve the following awards in recognition of gallantry displayed in flying operations against the enemy:—

Distinguished Flying Cross

P/O. A. M. SINGER, R.N.Z.A.F., No. 57 Sqn.—P/O. Singer has successfully completed attacks on the enemy's most heavily defended targets, including Berlin, Hamburg, Cologne and Essen. He also participated in the daylight attack on Milan. Throughout his operational tour this officer has consistently shown exceptional ability and devotion to duty.

P/O. P. L. SINGER, R.N.Z.A.F., No. 57 Sqn.—On October 17th, 1942, P/O. Singer was detailed to participate in the raid on Le Creusot, and although his windscreen had been smashed and the flight engineer injured by a collision with a bird, he pressed on and completed his mission. Early in 1943, within a short period P/O. Singer made attacks on targets at Nuremburg, Cologne, Berlin and Hamburg, on each occasion bombing the target successfully.

Act. Flt. Lt. J. A. BROADLEY, D.F.M., No. 161 Sqn.—Flt. Lt. Broadley has flown as navigator since April, 1940. He has fulfilled the duties of Squadron Navigational Officer with great success in two operational squadrons. On one occasion the aircraft in which he was flying came down at sea and it was entirely owing to Flt. Lt. Broadley that the crew were rescued. On two other occasions he has been involved in air accidents, but this officer continues to show an unabated enthusiasm for operational duties.

Act. Flt. Lt. J. COPE, D.F.M., R.A.F.V.R., No. 15 Sqn.—Since the award of the D.F.M., this officer has completed many sorties. He is an outstanding captain of aircraft who has invariably attacked his target with vigour and determination, no matter what the hazards.

Act. Flt. Lt. A. C. DOUGLASS, R.A.A.F., No. 109 Sqn.—Since August, 1941, Flt. Lt. Douglass has taken part in many operational attacks, including two against Essen. At all times he has shown a high degree of skill and initiative and proved himself to be a very capable navigator.

Act. Flt. Lt. S. I. HARDCASTLE, No. 50 Sqn.—Flt. Lt. Hardcastle has taken part in a large number of operational sorties against heavily defended targets, as well as in mine-laying operations off the French coast. On December 27th, 1941, he participated in the highly successful daylight raid on Vaagso.

Act. Lt. Lt. F. HILTON, R.N.Z.A.F., No. 7 Sqn.—Flt. Lt. Hilton has several times demonstrated his fine navigational skill by the precise timing of his aircraft at the target, regardless alike of the distance involved or the strength of the opposition.

Act. Flt. Lt. L. J. J. JUDSON, D.F.M., No. 161 Sqn.—Act. Flt. Lt. Judson has filled the post of W/T leader in three squadrons with great success and enthusiasm. While assisting in the formation of a Czecho-Slovakian squadron he did brilliant work in training wireless operators and finally accompanied them on six operational sorties. Act. Flt. Lt. Judson has taken part in numerous hazardous daylight operations.

Act. Flt. Lt. R. S. D. KEARNS, D.F.M., R.N.Z.A.F., No. 156 Sqn.—Flt. Lt. Kearns has invariably displayed high qualities as a pilot. He has completed numerous operational missions against targets in Germany and Italy.

Act. Flt. Lt. W. C. KLASSEN, R.C.A.F., No. 424 (R.C.A.F.) Sqn.—On all his sorties, many of which have been over the enemy's most heavily defended targets, Flt. Lt. Klassen has shown himself to be a courageous and determined pilot.

Act. Flt. Lt. R. H. PETCH, No. 76 Sqn.—This officer has completed a large number of operational sorties, which have included raids on targets such as Hamburg, the Ruhr and Berlin. One night in October, 1942, on the return journey from Genoa, his aircraft was attacked by an enemy fighter which twice closed to within 50 yards. It was due solely to the presence of mind and coolness displayed by Flt. Lt. Petch that the enemy aircraft was driven off and probably destroyed.

Act. Flt. Lt. R. J. L. POWELL, R.N.Z.A.F., No. 158 Sqn.—During his service with the R.A.F., this officer has taken part in operations over such targets as Essen, Bremen and Hamburg. He has also made attacks on Genoa and Turin and on the *Scharnhorst* and *Gneisenau* while these ships were lying in Brest harbour. His exceptional skill as a navigator caused his early withdrawal from full operational duties to act as an instructor.

Act. Flt. Lt. H. d'Arcy RANSOME, R.A.A.F.,

P/O P. L. Singer (left) and his twin brother P/O A. M. Singer—both New Zealanders of No. 57 Squadron—who have each been awarded the D.F.C. The official citations appear on this page.

No. 83 Sqn.—Flt. Lt. Ransome has shown exceptional enthusiasm to participate in operational flying. He has taken part in the majority of the long distance flights to Italy and the Baltic, together with the two raids on Berlin, on both of which the target was only located by the outstanding navigational ability and determination displayed by this officer.

Act. Flt. Lt. A. J. SAVAGE, R.A.F.V.R., No. 88 Sqn.—Flt. Lt. Savage has participated in many operational sorties, including a low-level attack on the Ford Works at Poissy, when the primary target was very severely hit, and an attack on the chemical works near Lille. Although a "screened" air gunner, Flt. Lt. Savage has volunteered for a number of operations and his high conception of duty has been an inspiration to other crews.

Act. Sqn. Ldr. P. J. E. RITCHIE, No. 143 Sqn.—This officer has completed much operational flying. On one occasion he led a formation of aircraft acting as fighter escort to a force of torpedo-carrying aircraft. Enemy fighter opposition was encountered and in the ensuing combat, Act. Sqn. Ldr. Ritchie displayed skilful leadership in frustrating attempts by enemy fighters to interfere with the torpedo-carrying aircraft he was escorting.

Act. Flt Lt. N. L. SHOVE, R.A.F.V.R., No. 102 Sqn.—Flt. Lt. Shove is a capable and determined squadron navigator who has taken part in attacks on the majority of the enemy's most heavily defended targets in Germany and Italy. He also participated in the "1,000" raids.

Act. Flt. Lt. R. N. STUBBS, D.F.M., R.A.F.V.R., No. 9 Sqn. (since deceased).—Since being awarded the D.F.M. in September, 1940, this officer has taken part in many further sorties. He also participated in the daylight raids on Le Creusot and Milan.

Act. Flt. Lt. F. G. TILLER, R.A.F.V.R., No. 59 Sqn.—Flt. Lt. Tiller has taken part in many operational sorties since August, 1941. When on his first mission he located and successfully bombed an enemy E-boat. In November, 1942, in daylight he made a most determined attack on a German destroyer and U-boat in a French harbour, despite intense opposition.

Home on Two Engines

Act. Flt. Lt. R. S. WILLIAMS, No. 51 Sqn.—This officer has completed many operational sorties, frequently encountering fierce opposition. On one occasion when detailed to attack Lorient one engine failed, but Flt. Lt. Williams continued the mission until the second engine showed signs of failing. On the return journey flying with two engines only, he was able to make a successful landing without causing further damage to his aircraft or injury to his crew.

Act. Flt. Lt. D. R. C. WYNESS, R.A.F.V.R., No. 50 Sqn.—Flt. Lt. Wyness has completed his operational tour with great success. He has participated in attacks against the majority of the most heavily defended targets in Germany and Italy, including the daylight raids on Le Creusot and Milan, several times bringing back excellent photographs.

F/O. H. L. BESFORD, R.A.F.V.R., No. 107 Sqn.—Since May, 1942, this officer has been employed as an observer and his coolness, resource and courage have been of the greatest assistance to his pilot. In June, 1942, when on patrol over the sea, F/O. Besford was responsible for locating a dinghy, with the result that its four occupants were rescued. Later in December, 1942, this officer was navigator in the leading aircraft of a force of bombers detailed to attack the Phillips Radio works at Eindhoven. While crossing the Dutch coast on the outward journey his aircraft struck a flock of seagulls, two of which came through the "perspex" and injured his lega. At the same time the draught whisked his maps away. Confronted with the task of finding the route from memory, F/O. Besford encouraged his pilot to proceed and the mission was successfully completed.

F/O. L. A. BOND, R.A.F.V.R., No. 88 Sqn.—This officer is a first-class navigator. He has participated in various forms of operational sorties, including smoke laying operations during the combined operation at Dieppe. F/O. Bond flew in the first "intruder" attack made in Boston aircraft, when, on June 25th, 1942, the airfield at Haamsteed was attacked from a low level with great success. Recently this officer has taken part in a highly successful attack on the airfield at St. Omer, when the headquarters buildings and dispersed aircraft were bombed accurately from a great height.

F/O. P. K. BURLEY, No. 107 Sqn.—F/O. Burley has served with this squadron since May, 1942, and has on all occasions shown himself to be a keen and determined pilot both in low level attacks and high level formation sorties. On two occasions he has flown his aircraft back to base when severely damaged by enemy fire. In the July, 1943, in the face of intense and accurate anti-aircraft fire, this officer persevered with his attack on Sluiskill explosive works from roof-top height, with excellent results. Three days later he made another determined attack from 50 feet on an enemy airfield and released his bombs on the dispersal areas despite strong opposition. At Eindhoven, in December, 1942, with great resolution, F/O. Burley led a number of aircraft in an attack on the Philips Radio Works, although his observer's "perspex" had been damaged by birds when crossing the Dutch coast and all maps had been lost.

F/O. G. CAMPBELL, No. 88 Sqn.—Since his arrival at this squadron in February, 1942, this officer has completed many daring operational missions. During the combined operations at Dieppe on August 19th, 1942, he took part with good effect. He also participated in the raid on the Philips Works at Eindhoven, where he accomplished the important task of deputy leader in a most creditable manner, making his attack from roof top height. On a number of other occasions F/O. Campbell has been deputy leader of formations, and once he led an attack on an armed raider in the docks at Dunkirk.

F/O. W. W. COLLEDGE, R.C.A.F., No. 405 (R.C.A.F.) Sqn.—F/O. Colledge was captain of an aircraft detailed recently to complete an anti-submarine patrol. While so engaged he was attacked by four Ju 88s, and a running fight ensued, which lasted 36 minutes. During the encounter one enemy aircraft was destroyed and two damaged.

F/O. O. A. CUSSEN, R.A.F.V.R., No. 161 Sqn.—F/O. Cussen has flown on operations since April, 1941. He has always pressed home his attacks with the utmost determination, and has several times brought back excellent photographs.

F/O. F. H. C. EFFORD, R.A.F.V.R., No. 542 Sqn.—This officer has been employed on reconnaissance duties since November, 1941. When the German battleships were in Brest he made many successful sorties over the port, often in bad weather, and despite heavy opposition. F/O. Efford has also flown on a number of sorties over targets in the Ruhr, Bremen and Berlin. Recently he has completed two highly successful operations over Kiel and North-West Germany.

SERVICE AVIATION

Sqn. Ldr. P. J. E. Ritchie, recently awarded the D.F.C. The official citation appears on this page.

F/O. E. KEAUFFLING, R.A.F.V.R., No. 50 Sqn.—Since April, 1942, F/O. Keauffling has flown on sorties against some of the enemy's most heavily defended objectives, including some in Italy. He also took part in the daylight raids on Le Creusot and Milan, his crew bringing home many excellent photographs.

F/O. T. R. MCDOUGALL, R.C.A.F., No. 420 (R.C.A.F.) Sqn.—This officer has a fine operational record. He has taken part in attacks against Turin, Mannheim, Essen, Hamburg, Duisberg, Cologne, Lorient and Stuttgart, besides several daylight bombing raids and mine-laying sorties. On one occasion during an attack on Hamburg F/O. McDougall's aircraft was heavily engaged by anti-aircraft fire for 40 minutes. With great skill, despite the violent evasive action taken by his captain and adverse weather, this officer navigated the aircraft safely back to base.

F/O. R. MCKIMM, R.A.F.V.R., No. 279 Sqn.—This officer has served in No. 279 Sqn. since November, 1941, and on several occasions he has been in charge of detachments of aircraft. During November, 1942, F/O. McKimm took part in four successful searches for dinghies in the Bay of Biscay. A month later he located a dinghy at night during a search lasting over six hours.

F/O. D. S. MARGACH, R.A.F.V.R., No. 106 Sqn.—F/O. Margach has completed 19 operational sorties, during which his accuracy in bomb-aiming has been outstanding. He has been engaged in attacks on a wide range of the enemy's objectives, and in a mining sortie, when he calmly laid mines only a very short distance from a warship. This officer's steadiness and coolness in the face of the fiercest opposition have been demonstrated by the excellent photographs he has obtained.

F/O. J. MARSHALL, R.N.Z.A.F., No. 7 Sqn.—This officer has at all times displayed a keenness and desire to engage the enemy which is most praiseworthy. His dependability and conscientious completion of his duties render him a valuable member of air crew.

F/O. R. N. RAYNE, R.A.F.V.R., No. 420 (R.C.A.F.) Sqn.—This officer has participated in many bombing operations with much success. He has taken part in sorties over many heavily defended targets, including Essen, Cologne, Bremen and Duisberg, and also in the attacks on Rostock and the German warships while they were at Brest.

F/O. H. A. SCOTT, No. 109 Sqn.—This officer began his operational career in the first month of the war in France. He served with a squadron flying Battles and fought throughout the Battle of France. His missions include both day and night raids.

F/O. G. B. TOLPUTT, R.A.F.V.R., No. 226 Sqn.—F/O. Tolputt joined the squadron in November, 1941. He has been engaged in a number of operations, including shipping beats and searches, as well as several low level attacks. At Dieppe he completed smoke-laying sorties with success, and took part with credit in the attack on Philips Works at Eindhoven. On some sorties F/O. Tolputt has acted as squadron fire controller.

F/O. T. WALLACE, R.A.F.V.R., No. 489 Sqn.—F/O. Wallace has taken part in a large number of sorties, including attacks against shipping, offensive patrols and bombing raids. He has invariably exhibited an intense desire to engage the enemy.

F/O. W. J. WELLER, R.A.F.V.R., No. 102 Sqn. This officer has participated in many daring operational raids on such targets as Essen, Berlin, Hamburg and Bremen. His marked ability as a pilot led to his appointment as an instructor at the end of his tour of operational duties.

P/O. J. C. BICKNELL, R.A.F.V.R., No. 226 Sqn.—P/O. Bicknell is a cool calculating navigator. He has taken part in a large number of sorties, including five set searches, and has participated in several other operations.

P/O. J. H. CRABB, R.A.A.F., No. 460 (R.A.A.F.) Sqn.—P/O. Crabb has displayed high qualities as a navigator, and it is largely due to his keenness and skill that his crew has consistently achieved good results.

P/O. W. D. CRIMMINS, R.C.A.F., No. 12 Sqn.—P/O. Crimmins is a most gallant gunner whose cheerful confidence, throughout his tour of operational duty, has inspired a high standard of morale and courage in his crew.

P/O. T. DRING, R.A.F.V.R., No. 647 (R.A.A.F.) Sqn.—This officer is a most confident and capable wireless operator who has taken part in thirty-three operational sorties without wireless failure. He has set an extremely high standard of technical efficiency, both in the air and on the ground.

P/O. C. C. A. FUCHS, R.A.F.V.R., No. 226 Sqn. (since deceased).—Since joining the squadron in April, 1942, P/O. Fuchs has participated in a variety of operations by day and night, including searches, low-level sorties and offensive sweeps.

P/O. J. A. HALL, R.A.F.V.R., No. 207 Sqn.—P/O. Hall has taken part in a large number of sorties, many of which have been against the enemy's most heavily defended targets. He has on all occasions displayed initiative, keenness and dogged determination.

Five on Essen

P/O. H. G. HARROWER, R.C.A.F., No. 101 Sqn.—During a tour of operations, which includes five attacks on Essen, his aircraft has been attacked twice by enemy night fighters and on each occasion by skilful evasive action he has safely brought his aircraft back. One night in February, 1943, this officer's aircraft was hit by a heavy shell and severely damaged. By superb airmanship he flew the bomber back and effected a masterly crash landing, causing only minor injuries to himself and one member of the crew.

P/O. W. A. IRWIN, R.N.Z.A.F., No. 15 Sqn.—This officer has taken part in many operational sorties with determination and courage. He has set a splendid example to all by his thoroughness in pressing home his attacks, undeterred by difficulties or enemy opposition.

P/O. F. G. JACKSON, R.A.A.F., *No. 460 (R.A.A.F.) Sqn.—P/O. Jackson has shown considerable ability and skill as an air bomber. He has been outstanding in his keenness to ensure that by accurate and careful aiming his mission should be successfully completed.

P/O. C. C. JERROMES, R.A.F.V.R., No. 218 Sqn.—Since June, 1942, P/O. Jerromes has taken part in operational flying with much success. On one occasion in September, 1942, when on a sortie to Bremen, one engine in his aircraft failed before the Dutch coast was reached but with great determination this officer continued and completed his mission successfully. Later in December, 1942, in a low-level attack, P/O. Jerromes' aircraft was hit several times by fire from an enemy aircraft and one starboard engine was rendered useless. He took successful evasive action by diving from 4,000 to 600 feet, and after bombing the target returned to base on three engines.

P/O. T. W. LEWIS, R.C.A.F., No. 106 Sqn.—P/O. Lewis flew on his first operational sorties as air gunner and then qualified as an air bomber, in which capacity he has completed many more sorties, achieving good results. This officer has participated in attacks against most of the heavily defended targets of the Ruhr, enemy naval ports and Italian targets, and has also flown on several mining sorties and in the daylight raid on Le Creusot. He has frequently brought back excellent photographs.

P/O. W. LYLE, No. 226 Sqn.—Since being with this squadron P/O. Lyle has taken part in twenty-four operational sorties, including three low-level attacks. Recently he has been leading his squadron.

SERVICE AVIATION

P/O. A. G. NEWBOUND, R.A.A.F., No. 207 Sqn.—This officer has participated in many operational sorties against very heavily defended targets in Germany. He also took part in the daylight raid on Le Creusot. During his tour of operations P/O. Newbound has not had a failure in wireless transmissions.

P/O. R. McR. NEWITT, R.C.A.F., No. 103 Sqn.—P/O. Newitt has participated in many operational sorties. In January, 1943, during an attack on Essen, the flying instruments in the officer's aircraft became unserviceable; despite adverse weather he pressed on to the target and successfully completed his mission. On yet a later occasion in January, when returning from Dusseldorf, P/O. Newitt's aircraft was attacked by a hostile night fighter and badly damaged. Although the rear turret was partially unserviceable, by skilful evasive tactics, he managed to reach cloud cover and return safely to base.

P/O. H. W. NIGHTINGALE, R.A.F.V.R., No. 61 Sqn.—This officer has participated in sorties on many heavily defended targets, including Bremen, Essen, Emden, Milan and Genoa. When returning from a sortie over the Baltic, on one occasion, his aircraft was heavily engaged by anti-aircraft ships and much deviation from the course was necessary. By extremely skilful work in trying circumstances P/O. Nightingale enabled the aircraft to avoid strongly defended areas and reached base successfully.

P/O. W. H. W. RAMSEY, R.A.F.V.R., No. 78 Sqn.—P/O. Ramsey is a first-class wireless operator, who has at all times displayed the greatest keenness in his operational duties.

Low-level Attacks

P/O. D. C. SAVAGE, R.A.F.V.R., No. 88 Sqn.—This officer joined the Squadron in November, 1941. He took part in the search for the *Scharnhorst* and *Gneisenau* in February, 1942, and also engaged in smoke-laying operations during the assault on Dieppe on August 19th, 1942. On two occasions P/O. Savage engaged in low-level attacks on power stations in occupied France. The first of these, at Comines, in August, 1942, was pressed home to such good effect that the installation was out of action for 13 weeks. On the second, which was equally successful, he bombed Mazingarbe Power Station from roof-top height. This officer has also taken part in intruder operations, and when he attacked the airfield at Haamstede, in Holland, from 150 feet, numerous fires were observed.

P/O. S. A. SOMERSCALES, R.A.F.V.R., No. 10 Sqn.—It is characteristic of this officer's flying ability that he never flew on an operational sortie in the role of second pilot. On his first sortie the main hydraulic pipe-line burst shortly after taking off and one engine failed, but P/O. Somerscales continued on his mission and bombed the target, returning with the bomb doors open. Returning from Bremen on another occasion this officer's aircraft was attacked for 15 minutes by six enemy fighters, and, although the bomber was hit, he succeeded in flying it back to base. Later in September, 1942, his aircraft was hit and badly damaged by shells. At the same time a Me 110 attacked from astern and inflicted further damage before being shot down into the sea after an encounter lasting ten minutes.

P/O. P. J. STACK, R.A.F.V.R., No. 88 Sqn.—This officer has performed consistently good work in operations. He participated in the sorties completed by the Squadron during the combined operations at Dieppe on August 19th, 1942, and also in the successful raid on the Philips works at Eindhoven, in which he acted as navigator to the deputy leader.

P/O. W. H. THOMPSON, R.A.F.V.R., No. 44 Sqn.—This officer has proved himself to be an excellent wireless operator and air gunner, who has completed many successful operational flights over enemy territory. On many occasions the safe return of the aircraft has been largely attributable to his efficiency.

W/O. B. W. CLAYTON, No. 51 Sqn.—W/O. Clayton is an outstanding operational pilot who has completed many raids on such targets as Hamburg, Kiel, Bremen, and Dusseldorf. In January, 1942, when detailed to attack Hamburg, the weather was most adverse, but W/O. Clayton continued on his way. A secondary target was eventually bombed, but only when the rear turret had become unserviceable and the inside of the pilot's cockpit was covered with frost.

W/O. L. H. C. GARDINER, R.C.A.F., No. 420 (R.C.A.F.) Sqn.—W/O. Gardiner is a most skilful navigator who has attacked a wide variety of targets, including Hamburg, Rostock, Cologne and Duisberg. He has also participated in sorties to Turin and Lorient. On several occasions he has attacked the target and flown his aircraft back to base, despite the most adverse weather.

W/O. R. W. WARD.—A considerable number of the operational sorties on which this officer has flown have entailed long hours of flying under arduous circumstances over enemy territory.

Act. Flt. Lt. A. J. G. JARVIS, R.A.F.V.R., No. 408 (R.C.A.F.) Sqn.—This officer has completed twenty-eight operational missions, including attacks on some of the most strongly defended targets in Germany and Northern France.

P/O. R. D. JOHNSTONE, R.A.F.V.R., No. 51 Sqn.—One night in April, 1943, this officer was the captain of an aircraft detailed to attack Essen. When nearing the target area the aircraft was attacked by an enemy fighter. The bomber sustained much damage and five members of the crew were wounded. In the face of this trying situation, the bombs were released and course was set for home. Although on the return flight he was deprived of his services as the flight engineer and the navigator, owing to their injuries, P/O. Johnstone flew the damaged aircraft back to this country. On arrival at an airfield he signalled for an ambulance and a doctor to standby in readiness to attend to his wounded comrades, and then effected a masterly landing without the aid of flaps.

Distinguished Flying Medal

Flt. Sgt. M. W. EGERTON, R.N.Z.A.F., No. 156 Sqn.—Flt. Sgt. Egerton has a long record of successful operational flying against targets in Germany, Italy and enemy-occupied territory. Throughout he has always displayed courage and devotion to duty.

Act. Flt. Sgt. S. C. GRIMWADE, No. 161 Sqn.—For a considerable time Flt. Sgt. Grimwade has been in charge of the air gunnery of the squadron. He has also completed a large number of operational flights, many of them being of long duration.

Act. Flt. Sgt. E. MAXWELL, No. 83 Sqn.—One night in Decemebr, 1942, Flt. Sgt. Maxwell was flight engineer in an aircraft detailed for operational duties. On the outward flight five attacks were made by an enemy fighter. The first burst of fire seriously injured the bomb aimer and set the bomb bay and its contents ablaze. With complete disregard of personal danger, Flt. Sgt. Maxwell strove to control the fire, jettisoned burning flares and other equipment, and with his bare hands beat out the flames on the clothing of the bomb aimer. Finally, when the fire had been quelled, he rendered skilful first-aid to the wounded airman. His prompt and unselfish action was responsible for the safe return of the aircraft.

Act. Flt. Sgt. A. J. MOLLER, R.N.Z.A.F., No. 156 Sqn.—Flt. Sgt. Moller is a most keen and determined bomb aimer who has achieved a fine operational record. His skill has been responsible for much of the success gained by his crew.

Act. Flt. Sgt. H. E. A. PRICE, R.N.Z.A.F., No. 156 Sqn.—Flt. Sgt. Price has at all times displayed an excellent knowledge of his duties as air gunner. He has taken part with keenness and efficiency in a large number of sorties against heavily defended enemy targets.

Sgt. A. F. BURCHER (R.A.A.F.), No. 106 Sqn.—Sgt. Burcher has completed a tour of operational duty during which he has displayed the greatest enthusiasm and keenness. He has taken part in attacks against German and Italian targets and mining sorties off France and in the Baltic. He also flew as rear gunner in the daylight raids on Danzig and Le Creusot. In July, 1942, when returning from Saarbrucken the aircraft in which he was flying was attacked by five enemy fighters. This airman's excellent commentaries enabled his captain to evade two of them, and his well-directed fire drove off another two and assisted in the destruction of the fifth.

Sgt. J. R. BURTON, R.C.A.F., No. 405 (R.C.A.F.) Sqn.—In December, 1942, this airman was captain of an aircraft detailed for an anti-submarine patrol. An enemy convoy was sighted and while engaged in shadowing it his aircraft was attacked by two Ju 88s. In the ensuing action one of the hostile aircraft was destroyed, and the other damaged and probably destroyed.

Sgt. R. T. CLARKE, No. 50 Sqn.—Sgt. Clarke has participated in raids on many of the most highly fortified German targets and also in the daylight attacks on Le Creusot and Milan. In addition to his normal duties for some time Sgt. Clarke has been acting as an instructor to flight engineers.

Sgt. F. CLARK, No. 15 Sqn.—Sgt. Clark has acquitted himself with considerable courage and ability, both as a gunner and as fighting controller. He has shot down one enemy aircraft and probably destroyed another. On at least two other occasions this airman's skilful directions have enabled his captain to take successful defensive tactics and extricate his aircraft from very hazardous combats.

Sgt. A. COLLINS, No. 214 Sqn.—Sgt. Collins has taken part in operational sorties covering a wide range of heavily defended enemy targets, including five operations against the Ruhr.

Sgt. A. S. COOK, R.A.A.F., No. 103 Sqn.—This airman has displayed outstanding determination to bomb his target accurately and to bring back a record of his achievements. He was particularly successful in raids on Milan, Turin and Lorient.

Sgt. F. W. ELLIOTT, No. 207 Sqn.—During the period of his operational duties as wireless operator, Sgt. Elliott has never had a wireless failure, even although one occasion it has been necessary for him to repair his equipment during operational flights. During the low-level attack on Rostock, in particular, he used his guns with great effect.

Sgt. R. F. EVANS, No. 138 Sqn.—This airman has displayed exceptional skill as a flight engineer, and his keenness has proved a great asset to the squadron. His technical knowledge and experience have been largely responsible for the success of the operations on which he has flown, all of which have been of a special nature.

Sgt. J. GIBSON, No. 61 Sqn.—Sgt. Gibson has participated in operational sorties on varied German and Italian targets, including the strongly defended area of Berlin, Essen, Cologne, Bremen and Hamburg. He has brought back some excellent photographs.

Sgt. R. J. GOODE, No. 76 Sqn.—Sgt. Goode has a fine record of operational flying. He has participated in attacks on the majority of the enemy's most heavily defended targets, including five sorties to the Ruhr.

German and Italian Targets

Sgt. G. HARRISON, No. 50 Sqn.—Sgt. Harrison has flown on operations since July, 1942. He has taken part in raids on many heavily fortified German and Italian targets. One night in September, 1942, he was in an aircraft detailed for a low-level attack. On the return journey the aircraft was hit by anti-aircraft fire and very badly damaged, but the pilot with the skilful cooperation of Sgt. Harrison flew it safely back to base.

Sgt. F. C. JACKSON, No. 15 Sqn. (since deceased).—Sgt. Jackson's determination and skill, both on the ground and in the air, have always been of the highest order. His enthusiasm has been reflected in his successful training of flight engineers and by his great devotion to duty.

Sgt. P. G. LANGDON, No. 207 Sqn.—During the course of his operational career Sgt. Langdon has shown keenness and devotion to duty. On one occasion his aircraft was attacked and badly damaged by an enemy night fighter. Both mid upper and rear turrets and the elevator and trimming tabs were rendered unserviceable. By successfully executed evasive tactics Sgt. Langdon managed to escape from the night fighter and fly safely back to base. This airman has taken part in attacks against many very heavily defended targets, and also in the daylight raids on Le Creusot and Milan.

Sgt. H. MILLS, No. 115 Sqn.—During a tour of

Air Vice-Marshal H. Saunders, C.B.E., M.C., D.F.C., who a short while ago presented a new crest to a famous night-fighter squadron in his group. He is seen here (right) chatting with Wing Cdr. John Cunningham, D.S.O. and Bar, D.F.C. and Bar, the night-fighting expert.

operational duty Sgt. Mills has flown in attacks against many of the enemy's most heavily defended targets. Throughout his navigation has been of a high standard and has served as a model to less experienced navigators. On no occasion has he made a navigational error.

Sgt. S. A. PEARCE, No. 15 Sqn.—Sgt. Pearce has flown on a large number of operational sorties during which he has displayed marked determination and keenness. By his enthusiasm for operational flying and his knowledge and skill in the performance of his duties, this airman has set a fine example to the other members of his squadron.

Sgt. J. C. RALPH, R.N.Z.A.F., No. 101 Sqn.—Throughout his service with this squadron, Sgt. Ralph has pressed home his attacks in the face of strong opposition and has fearlessly completed many sorties in difficult circumstances. In December, 1942, when returning from Frankport, Sgt. Ralph displayed exceptional skill and airmanship in landing his aircraft safely at base though both port engines had failed and visibility was only 300 yards. During the raid on Berlin in January, 1943, when his aircraft was damaged by anti-aircraft fire and the petrol tanks were holed, this airman again displayed great coolness and ability by returning without sustaining further damage despite very poor visibility.

Sgt. N. RATTEN, R.A.A.F., No. 460 (R.A.A.F.) Sqn.—Sgt. Ratten has displayed great efficiency and enthusiasm as a wireless operator throughout his operational tour. His courage and devotion to duty have always been an inspiration to his comrades.

Sgt. D. S. SMITH, No. 76 Sqn.—One night in June, 1942, Sgt. Smith was detailed to take part in an attack on Emden. While still over enemy territory the aircraft in which he was flying was so severely damaged that the captain gave orders to abandon it. One of the crew's parachute was burnt and Sgt. Smith in an endeavour to save his comrade's life took him on his back when he abandoned the bomber, although he was well aware he was seriously prejudicing his own chances of a successful descent. His companion unfortunately fell off during the descent and Sgt. Smith received severe injuries on hitting the ground.

Sgt. E. A. TAYLOR, R.C.A.F., No. 405 (R.A.A.F.) Sqn.—Sgt. Taylor has participated in many operational sorties. On one occasion he was serving as mid-upper gunner in an aircraft detailed for an anti-submarine patrol when his aircraft was attacked by a formation of four Ju 88s. A running fight ensued lasting thirty-six minutes during which, as a result of the fine marksmanship of this airman, one hostile aircraft was shot down and others were damaged.

Sgt. W. G. TEAGUE, No. 115 Sqn.—This airman has completed a successful tour of operational duties. He has been known throughout the squadron for his resourcefulness and coolness and has set an excellent example to other rear gunners.

Sgt. A. W. H. TUSTIN, No. 61 Sqn.—Sgt. Tustin has displayed fine qualities of skill and efficiency throughout his operational tour. His reliability has permitted his captain to proceed on operational sorties without anxiety over technical matters.

THE KING has been graciously pleased to approve the following awards:

B.E.M. (Mil.)

Cpl. H. D. HOUGHTON, No. 83 Sqn.—Cpl. Houghton, who is employed as an armourer, has displayed outstanding zeal and devotion to duty. On one occasion during a period of intensive operations, Cpl. Houghton was in charge of the bomb-loading crew of a Lancaster aircraft when he observed a light under the bomb cell of another aircraft about 200 yards away. He saw some airmen leaving the spot and, knowing the aircraft to be loaded with bombs, he ran to it and found that a container of 90 incendiary bombs had been released. Displaying courage and initiative, Cpl. Houghton picked up and threw away some 30 of the incendiaries, clearing those which were burning near to the wheels of the aircraft and others which were ejecting sparks into the bomb cell. The remainder were in one mass and burning fiercely. Cpl. Houghton procured a steel sheet and covered the burning incendiaries with it. Having got this dangerous situation temporarily under control, he called to the ground crew, who assisted him to push the aircraft clear. Under his direction the crew ultimately managed to subdue all the incendiaries. The aircraft concerned had on board several hundred incendiary bombs and one 4,000lb. high-explosive bomb. Cpl. Houghton's gallant acton undoubtedly saved a valuable aircraft and prevented damage to others in the vicinity. He sustained several burns on both hands, which necessitated medical treatment for a considerable time.

Cpl. H. L. SPARKS, R.A.F.V.R.—This airman is a clerk in a station orderly room. During more than two years' service in Malta he has displayed courage, determination, carrying out his duties under difficult conditions in a praiseworthy manner. Twice during heavy enemy air attacks, in March and April, 1942, the orderly room sustained severe damage, yet Cpl. Sparks assisted in removing documents without thought of his personal safety. On one occasion he returned to his office to remove documents while a large unexploded bomb was within 50 yards of the building. Shortly afterwards the bomb exploded and destroyed the building. During a night in July, 1942, this airman was an occupant of a tent when one adjoining it, only five yards away, received a hit by an anti-personnel bomb. Although injured in five places by bomb splinters, Cpl. Sparks crawled back into his tent, which was on fire, in an effort to extinguish the flames and rescue a companion who had been killed. Before he was taken to hospital he attempted to rescue another occupant of the tent who was injured.

Fully feathered fighter : A de Havilland Mosquito F II showing its ability to formate with one engine stopped.

Roll of Honour

Casualty Communiqué No. 236.

THE Air Ministry regrets to announce the following casualties on various dates. The next of kin have been informed. Casualties "in action" are due to flying operations against the enemy; "on active service" includes ground casualties due to enemy action, non-operational flying casualties, fatal accidents and natural deaths.

Of the names in this list 99 are second entries giving later information of casualties published in earlier lists.

Royal Air Force

KILLED IN ACTION.—Flt. Sgt. R. Birtwhistle; P/O. G. C. W. Francis; Sgt. G. E. Gadd; Sgt. F. J. Millar; F/O. P. H. Norton; Sgt. J. A. Peel; Sgt. W. Standring; Sgt. W. H. Whiting.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. M. W. Buckley; Sgt. J. B. Kehoe; Sgt. D. C. King; Sgt. D. S. McNeil; Sgt. E. H. March; Sgt. A. Miller; Sgt. A. Mills; Sgt. F. G. E. Pierson; F/O. R. B. Seddon.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. W. J. Atchison; Sgt. F. Bennett; P/O. F. A. Bolton; Flt. Sgt. A. H. Bolus; Sgt. R. F. Churchill; Sgt. J. C. Clark; Sgt. W. Cobell; Sgt. R. C. Cushway; Sgt. R. Day; Sgt. D. A. Doughwaite; Flt. Sgt. J. C. Drennan; Sgt. L. E. Evans; Sgt. R. Ferguson; Sgt. D. R. Frecar; Sgt. L. A. Fussey; Sgt. A. H. Greenfield; Sgt. R. B. Hewitt; Sgt. H. Humm; Sgt. T. E. Jenkin; Sgt. A. H. Johnson; W/O. P. O. Jones, D.F.M.; Sgt. H. G. Kingston; Sgt. T. H. Lawton; P/O. A. F. Litzow; Sgt. R. M. McIntosh; Sgt. W. K. F. Marshall; Sgt. J. H. Miller; Sgt. J. L. Mitchell; Sgt. A. W. Munro; Flt. Sgt. G. E. H. Obott; P/O. A. E. Parsons; Sgt. J. E. T. Saunders; P/O. H. E. A. Scard; Sgt. S. S. F. Scott; Flt. Sgt. C. H. Ship; Sgt. R. D. Steer; P/O. E. S. Taylor; P/O. D. V. Thesiger; Flt. Sgt. P. H. H. Thirkell, D.F.M.; P/O. T. N. Tree; P/O. R. B. Underwood; Sgt. H. R. F. Wakeford; Sgt. A. S. Woodbridge; Sgt. J. P. S. Worling.

WOUNDED OR INJURED IN ACTION.—F/O. K. F. MacDonald.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—Sgt. D. Marsden.

MISSING, BELIEVED KILLED IN ACTION.—Sgt. E. J. Aspden; Sgt. R. Davies; Sgt. R. E. Franklin; Sgt. J. H. Kimber; Sgt. F. Morton; Sgt. G. C. W. Warren.

MISSING.—F/O. C. R. C. A. Allberry; Sgt. D. Andrew; F/O. P. J. C. Bateman-Champain; Sgt. S. A. Bayfield; Act. Flt. Lt. H. J. Beck; F/O. S. S. Brand; Sgt. R. W. Brodie; Sgt. H. W. Brown; Sgt. A. Burson; Sgt. W. Carr; Sgt. F. J. Cherry; Flt. Lt. J. D. Cole; Sgt. J. Conroy; Sgt. J. A. Cross; Sgt. E. Davies; P/O. C. G. Dawson; P/O. A. R. Dicker; Sgt. A. R. Dove; Sgt. A. D. Edmondson; Sgt. S. Ellam; Flt. Sgt. S. R. Farley; Sqn. Ldr. P. T. Flower; Flt. Sgt. L. Fieldhouse; Sgt. G. Fisher; P/O. G. B. Gibson; Sgt. S. N. Goddard; Sgt. R. Gowing; Act. Sqn. Ldr. The Hon B. Grimston, D.F.C.; Flt. Sgt. K. R. Hazelwood; Sgt. J. R. A. Hodgson; Sgt. H. Hope; Sgt. E. T. R. Howard; Sgt. J. Hoyland; Sgt. J. R. Jeffery; Sgt. R. E. Jeffreys; Sgt. G. Jennings; Sgt. J. ?. Jewell; Sgt. N. W. Johns; F/O. L. J. Johnson; Sgt. G. A. Jones; Sgt. J. E. Jones; Sgt. D. Keenan; Sgt. R. J. Kernick; Sgt. H. R. Kinder; F/O. H. B. Levinson; Sgt. G. R. Lewis; Sgt. R. S. V. Lewis; Flt. Sgt. E. L'E. Lightfoot-Shandley; Sgt. A. Lucas; Sgt. J. MacCormack; Sgt. J. McCormick; P/O. L. J. McCullock; Sgt. D. McEwen; Sgt. A. S. McLaren; F/O. A. B. Marsh; P/O. P. W. Masters; Sgt. R. A. Mears; P/O. J. L. Metcalfe; P/O. D. M. Mitchell; Sgt. C. H. Mitton; Sgt. R. J. Moss; P/O. M. O. L. Naper; Flt. Sgt. J. R. Orr; P/O. A. C. Palmer; P/O. A. H. G. Paxton; Sgt. R. Pilson; Sgt. F. W. Pinkerton; Flt. Sgt. A. L. S. Portch; Flt. Lt. T. H. O. Richardson; Sgt. T. J. Ridd; Sgt. W. Rishton; Sgt. W. M. Robertson; P/O. W. A. Robinson; Sgt. P. R. Rutter; Sgt. R. S. Sabell; F/O. L. R. C. Shadwell; Sgt. L. Shepherd; Sgt. J. H. Sibley; P/O J. W. Simpson; F/O. K. F. Smart; L.A/C. A. L. Smillie; P/O. F. A. Southon; Act. W/O. G. C. Stafford, D.F.M.; P/O. R. C. Stemp; P/O. A. J. Stuart; Sgt. M. E. Taylor; Sgt. J. E. Turnbull; Flt. Sgt. S. J. Volante, D.F.M.; Sgt. A. Ward; Sgt. R. L. Ward; Sgt. B. J. Warr; Sgt. H. C. H. Webb; Sgt. T. H. Webb; Flt. Lt. J. H. Wetherly; Flt. Lt. I. White; Sgt. A. H. J. Whittle; Sgt. E. Williams; Sgt. A. W. E. Wilson; Sgt. T. J. Woodward; Sqn. Ldr. C. L. Wright; Act. Flt. Lt. P. B. Wright, D.F.C.

KILLED ON ACTIVE SERVICE.—Sgt. L. E. Ayres; Sgt. R. O. Barnwell; Sgt. T. H. Brown; Sgt. L. L. Bull; P/O. J. Burgess; Sgt. W. A. Clark; Sgt. A. F. Davidson; Flt. Sgt. J. E. Davis; F/O. R. S. Draper; Sgt. J. R. Franks; P/O. D. N. A. Griffin; F/O. T. E. G. Hanson; Sgt. W. Harvey; Sgt. F. Heywood; Sgt. F. A. W. Hood; F/O. D. W. Jackson; Sgt. J. Keedwell; Sgt. R. V. Loose; A/C.1 E. J. Murphy; Flt. Sgt. F. Nicholson; Sgt. E. Walsh; Sgt. D. R. Williams.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Sgt E. Boaler; Sgt. L. Hargrave; Sgt. A. J. P. Howe; Sgt. R. McH. Jack; Sgt. A. Longhurst; P/O. I. G. T. Roberts.

WOUNDED OR INJURED ON ACTIVE SERVICE.—A/C.1 V. Jefsioutine; L.A/C. J. W. Mitchell; Sgt. W. Rusby.

DIED ON ACTIVE SERVICE.—L.A/C. B. L. Bayliss; Cpl. W. J. Burrows; A/C.2 C. V. T. Dixon; A/C.2 F. S. Dymond; Sgt. W. C. Haldeman; Cpl. R. Smith; L.A/C. K. T. L. Wade; F/O. E. R. Wetton.

Royal Australian Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. J. A. B. Marshall; Sgt. C. C. Ogilvie; Sgt. C. R. Podmore.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. H. K. Bedwell; Sgt. F. C. Brayne; P/O. G. M. Briggs; F/O. R. J. Cooper; Sgt. L. C. U. Dreyer; Sgt. C. G. Fort; Sgt. V. Lewis; Sgt. A. L. Moyle; Sgt. R. J. Perry; Sgt. R. J. B. Sharkey; Sgt. R. A. Wilson.

WOUNDED OR INJURED IN ACTION.—P/O. P. Delahunty.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—Flt. Sgt. W. H. Oakes.

MISSING.—P/O. V. N. Ballard; F/O. K. Girrbach; Flt. Sgt. J. S. Henderson; Sgt. J. H. D. Herbeate; Flt. Sgt. J. A. R. Hunt; Sgt. J. V. O'Loughlin.

KILLED ON ACTIVE SERVICE.—F/O. A. McM. Paton.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Sgt. K. J. Chandler.

DIED ON ACTIVE SERVICE.—Cpl. J. F. Beresford.

SERVICE AVIATION

Royal Canadian Air Force

KILLED IN ACTION.—Sgt. R. Frank.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. F. W. Cassidy; Sgt. G. Le R. Ellsworth; P/O. J. H. Freestone; P/O. G. B. Hart; Sgt. J. B. Higginson; F/O. H. W. Thompson.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—P/O. M. G. Abey; Flt. Sgt. R. J. Anderson; Sgt. J. K. Baker; Flt. Sgt. A. K. Farnie; P/O. D. R. Florance; Sgt. T. Gibbons; P/O. R. A. Laing; Flt. Sgt. H. E. Magladry; Flt. Sgt. R. F. Noton; Sgt. C. O. O'Brien; P/O. R. S. Patterson; Sgt. G. A. Pearce.

MISSING, BELIEVED KILLED IN ACTION.—Sgt. J. A. Bailey; Sgt. J. F. Gubb; Sgt. R. E. Todd; Sgt. P. F. Yellin.

MISSING.—Sgt. H. G. Allen; Sgt. J. F. Barnes; Sgt. W. McM. Bissett; Sgt. C. A. Boyd; Act. Flt. Sgt. C. M. McG. Coghill; Sgt. H. Davenport; Sgt. W. J. Dawson; Sgt. R. O. M. Dunlop; P/O. F. L. E. Dupre; Sgt. J. H. M. Fraser; P/O. R. R. Grimes; Flt. Sgt. R. W. Harbottle; Sgt. W. G. Hoar; Sgt. D. F. McFadden; F/O. G. F. Mabee; Sgt. N. W. Roberts; Sgt. P. Shmigelsky; P/O. L. T. E. Sweet; Sgt. R. A. Weese.

KILLED ON ACTIVE SERVICE.—Flt. Sgt. W. V. Rattee.

Royal New Zealand Air Force

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. T. H. Cray; P/O. K. F. Heald; P/O. R. H. Higgins; Flt. Sgt. J. G. McCutchan; Sgt. R. W. Vessey; P/O. J. D. Webster.

MISSING.—Flt. Sgt. F. W. Bacon; F/O. C. J. Freshney; Flt. Sgt. W. P. Lanigan.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—Sgt. W. F. Irwin.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—Sgt. C. D. Charters.

South African Air Force

MISSING.—Lt. D. M. Chaplin; Lt. D. R. Davies; Lt. R. L. McCartney; Flt. Sgt. L. Orlek; Flt. Sgt. B. C. Rowe; Lt. G. E. Sale.

KILLED ON ACTIVE SERVICE.—2/Lt. D. Podlar; Flt. Sgt. E. Rusiecki.

Casualty Communiqué No. 237.

Of the names in this list 103 are second entries giving later information of casualties published in earlier lists.

Royal Air Force

KILLED IN ACTION.—Sgt. W. S. Davies; Sgt. F. W. Dorrington; P/O. D. M. Dunn; Sgt. J. Fage; Flt. Sgt. J. F. Garbutt; Sgt. G. T. W. Gibson; P/O. D. W. F. Harper; P/O. M. W. Hume; P/O. W. H. Jenkins; Sgt. J. King; Sgt. D. G. Lamble; Sgt. W. J. McGraith; Sgt. G. J. Orton; Flt. Sgt. N. Sherriff; Sgt. M. C. C. Squiers; Sgt. E. P. O. Watson; W/O. W. A. Woodman.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. V. C. R. Baker; Sgt. A. Burns; P/O. G. C. Day; Sgt. I. L. Eagleton; Sgt. L. C. Fenton; Sgt. R. Freak; P/O. R. W. S. Hayes; Sgt. G. W. Jackson; Sgt. R. Kitney; Sgt. W. J. Lambie; Sgt. K. C. May; Sgt. W. L. Mogford; Flt. Sgt. J. Nash; Sgt. R. G. A. Richards; Sgt. G. W. Rowe; P/O. G. G. Soames; Sgt. G. W. Tull; Sgt. R. T. Ward.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—P/O. E. G. H. Allen; Sgt. S. Beaumont; Sgt. F. D. Chudleigh; Sgt. H. E. Cruze; Sgt. J. Doughty; Sgt. D. I. Dunn; P/O. W. Glenn; Sgt. J. F. Grimmett; P/O. T. G. H. Gulliver; Sgt. J. C. Harold; Sgt. A. Harris; Sgt. J. Heslop; F/O. L. J. Jackson; Flt. Sgt. S. Jones; Act. Sqn. Ldr. R. Miller; Sgt. M. O'Brien; Sgt. H. R. Parfitt; Sgt. G. B. Paterson; Sgt. B. T. Randall; Flt. Sgt. T. W. Rayment; Sgt. D. Rowles; Flt. Sgt. G. Smith; F/O. V. G. D. Spiller; Sgt. E. R. Stirling; P/O. G. A. Strasser; Sgt. E. G. Tapner; P/O. C. D. Waddingham, D.F.C.; Flt. Sgt. D. S. D. Welsh; P/O. D. White.

WOUNDED OR INJURED IN ACTION.—Sgt. F. Hilton; Sgt. B. R. Taafe.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—Sgt. F. C. Potter.

MISSING, BELIEVED KILLED IN ACTION.—Sgt. F. A. Bandeen; Flt. Sgt. R. J. G. Campbell; Sgt. W. P. D. Chapman; Sgt. B. J. F. Crook; Sgt. C. Field; Sgt. A. E. Fisher; F/O. M. J. French; Sgt. S. R. O. Hermon; Sgt. D. R. Jeffrey; Sgt. E. McKim; Sgt. I. L. MacLean; Sgt. E. H. S. Marsh; Sgt. P. Perry; Sgt. E. J. Smith.

MISSING.—P/O. J. R. Armstrong; F/O. E. R. V. Ashcroft; F/O. R. A. H. Ayles; W/O. T. W. Barker; Sgt. C. A. Bell; Sgt. E. A. Biggs; Sgt. E. S. Bowen; Sgt. A. B. Boyd; Sgt. J. Broderick; Flt. Sgt. R. Brough; F/O. I. C. Burns; Sgt. K. R. Burton; Sgt. J. E. Callaghan; F/O. J. M. Campbell; Sgt. H. D. G. Carty; Sgt. G. H. J. Cash; Sgt. H. G. Chuck; A/C.1 R. D. B. Clark; Flt. Lt. A. C. Cochrane, D.F.C.; P/O. W. F. Coldwell; F/O. S. Cornforth; Sgt. L. J. Cursley; A/C.1 E. Dalton; F/O. M. Davies; Sgt. A. G. Deane; Sgt. J. M. Donald; Sgt. T. Edwards; Sgt. G. V. Eld; Sgt. J. Fox; Sgt. A. H. Fry; Sgt. A. J. Gordon; Sgt. P. J. Groom; Sgt. D. H. Harper; F/O. J. F. Harris; Sgt. T. W. Harris; Flt. Sgt. E. K. Hart; Sgt. C. J. B. Hele; Sgt. R. H. Holtham; F/O. N. C. Johnson; Sgt. R. Kennedy; Flt. Sgt. A. Lowe; Sgt. G. B. McFarlane; Sgt. E. McGloin; P/O. A. Metcalf; Sgt. T. A. Miles; Flt. Sgt. C. H. Newman; Sqn. Ldr. C. O. O'Donoghue; Sgt. H. M. Parsons; P/O. R. A. Phillips; Sgt. F. J. Platt; Sgt. B. A. Rawlinson; A/C.2 W. A. Reynolds; Sgt. H. Richardson; Sgt. D. S. Saunders; Sgt. R. E. Scott; Sgt. L. R. J. Shrubsall; Sgt. D. J. Simmons; Flt. Sgt. A. F. Smith; F/O. J. C. Smith; Sgt. S. Stafford; Sgt. G. T. Still; Sgt. J. H. Strathern; Sgt. R. H. G. Taylor; Sgt. B. C. Trivitt; Sgt. W. A. Vesely; Sgt. A. Watson; Sgt. F. Waywell; Sgt. J. Westerdale; Sgt. W. F. Whiteland; Sgt. J. E. Winn; Sgt. R. G. Wright.

KILLED ON ACTIVE SERVICE.—Sgt. H. Applegarth; A/C.1 R. J. Chitty; Act. Flt. Lt. D. R. Greenup; P/O. D. G. Gatehouse; P/O. G. I. Gunter; P/O. W. T. Hobday; P/O. E. R. Jones; Sgt. T. J. Knock; Sgt. A. Laycock; Sgt. W. H. Lowey; Sgt. J. MacNeal; Sgt. L. Maydew; Sgt. E. C. Meredith; Sgt. B. S. Ransom; F/O. L. Waite; Sqn. Ldr. R. V. Whitehead, D.F.C.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Sgt. P. G. Cannell.

WOUNDED OR INJURED ON ACTIVE SERVICE.—P/O. L. J. Hurd.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—Sgt. R. Waterhouse; A/C.1 K. M. Woodward.

DIED ON ACTIVE SERVICE.—L.A/C. T. Bedford; L.A/C. F. A. Drake; Cpl. J. A. Field; Act. Flt. Lt. W. J. D. Fleming; Cpl. A. A. Guest; A/C.2 W. E. M. Horn; L.A/C. W. Howard; L.A/C. T. P. R. Hulley; L.A/C. L. C. A. Lane; A/C.1 G. Lee; Flt. Lt. B. J. McMaster, D.F.C.; A/C.2 P. G. Ritchings; Cpl. P. J. Rogers; Sgt. A. F. Spice; Cpl. A. W. Watson; A/C.2 J. C. Whiston.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—Sgt. R. L. Berry; Cpl. W. J. Brooks; L.A/C. H. Brown; Sgt. L. B. Brown; Sgt. J. M. Hamilton; Sgt. G. Maxwell; Sgt. N. R. Millison; Sgt. G. H. Rapson; Sgt. W. V. Roderick; Sgt. B. H. Vickery; A/C.1 D. J. Woods.

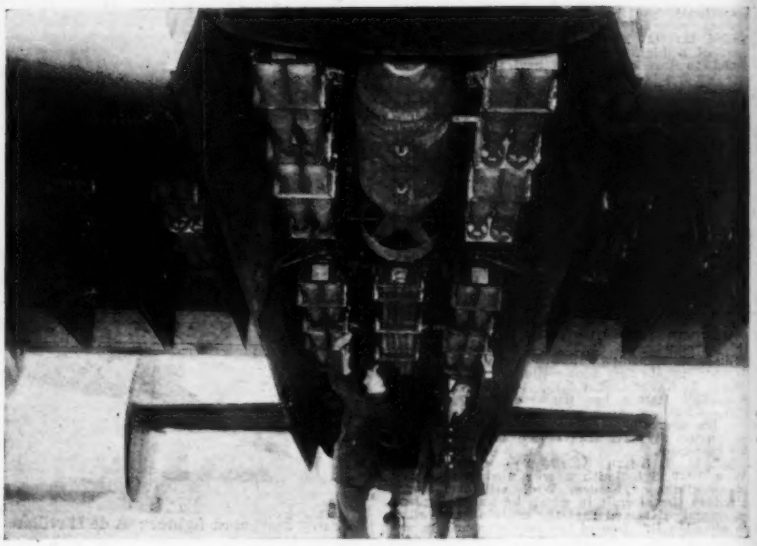
Royal Australian Air Force

KILLED IN ACTION.—Flt. Sgt. S. A. Osborn; Flt. Sgt. F. Richardson; F/O. A. R. Wecker; F/O. M. G. Williams.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—P/O. C. W. P. Persse.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—P/O. M. R. R. Green; Sgt. C. G. Veal.

MISSING, BELIEVED KILLED IN ACTION.—Flt. Sgt. D. H. V. Charlick; Flt. Sgt. E. N. Cooper; Flt. Sgt. G. V. Hampton; P/O. G. E. McNaughton; P/O. T. H. McNeill.



Well disposed : How the big high explosive bombs, the 30 lb. and other incendiaries are packed away in the bomb racks of a Handley Page Halifax.

Royal Canadian Air Force

KILLED IN ACTION.—Flt. Sgt. W. P. Comrie; Sgt. H. T. Hennie; Flt. Sgt. R. S. Sandelin.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—P/O. G. Murray.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. J. A. Bissett; P/O. D. Y. Claxton; Sgt. T. A. Crawford; P/O. R. McF. Graham; Flt. Sgt. H. Grey-Noble; Sgt. G. Hall; Sgt. R. Hancock; Flt. Sgt. E. E. Hopper; F/O. D. D. P. Joyce; Sgt. J. J. Kincaid; Flt. Sgt. E. E. Kirby; Sgt. G. D. Klarner; Sgt. C. L. Love, Jnr.; W/O. G. P. McLean; P/O. R. J. Majeau; P/O. D. Malofie; Sgt. J. Molnar; P/O. W. F. Munn; P/O. J. MacL. Murdock; Sgt. R. C. Pearce; P/O. C. B. Ramsay; Flt. Sgt. B. W. Reynolds; P/O. J. A. Richard; Flt. Sgt. H. E. Roberts; Sgt. C. W. Starrett; P/O. J. R. Tucker; Sgt. A. E. G. Wheadon; Sgt. E. G. Wilson.

MISSING, BELIEVED KILLED IN ACTION.—Sgt. T. C. Dubose; Sgt. L. L. Hamelin; Sgt. E. A. Norman; Sgt. K. E. Price; Flt. Sgt. W. B. Staunble.

MISSING.—Sgt. W. J. Arnold; Flt. Sgt. D. L. Bain; P/O. F. N. S. Cavanaugh; P/O. C. M. Chambers; P/O. G. Cojocar; Sgt. C. L. Copping; F/O. H. G. Farrington; Sgt. G. W. Herrington; Sgt. W. A. Kopacz; Sgt. J. F. J. McCaw; Sgt. E. D. McCullagh; Flt. Sgt. R. W. MacNeill; Sgt. R. G. Montgomery; Sgt. A. H. Penner; Sgt. F. Spino; P/O. H. E. Tanner; Flt. Sgt. J. Taylor; F/O. R. J. Weatherhead; F/O. W. C. Zapfe.

KILLED ON ACTIVE SERVICE.—P/O. R. P. Dezall; Sgt. C. C. Gamble; Sgt. B. C. Harvey; Sgt. A. Scarth.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—F/O. C. D. R. Chappell; Flt. Sgt. C. E. Dauphin; F/O. C. E. L. Hare.

Royal New Zealand Air Force

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—P/O. T. T. Fox; Sgt. W. J. Paterson.

MISSING, BELIEVED KILLED IN ACTION.—Sgt. H. C. Duckmanton.

MISSING.—Sgt. J. H. Orr.

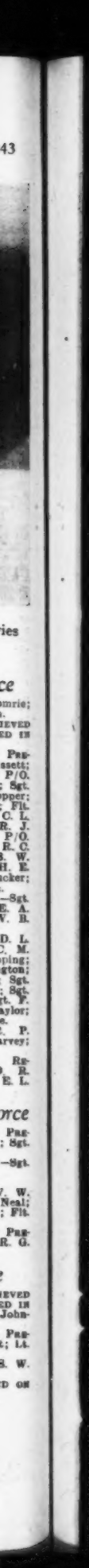
KILLED ON ACTIVE SERVICE.—Sgt. R. W. W. Gallie; Sgt. M. R. Langdale-Hunt; P/O. B. Neal; Flt. Sgt. K. M. Newland; F/O. E. A. Perry; Flt. Sgt. G. T. Ryan.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Sgt. R. G. Harkins.

South African Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Lt. G. Bennett; Air Sgt. D. N. Johnston; Air Sgt. C. J. Kincaid.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Maj. R. Tennent; Lt. J. W. Van Niererk.

MISSING.—Lt. P. S. Ashton; Flt. Sgt. S. W. Bernits; Flt. Sgt. P. E. Black.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—Pte. A. W. October.